

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS
edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our

editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

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FRIDAY, DECEMBER 8, 1905.

The impression gained from reading that portion of the President's message which relates to railroad rates is that Mr. Roosevelt has clearly defined his ideas to the extent that rate makings should be done only by an administrative commission, not by a court. He makes this point well, and he also takes up somewhat in detail the abuses of discrimination and the type of unfairness represented by the private car lines. The President again commits himself to the fallacy that there is a material difference between government rate regulation after complaint and government rate regulation *de novo*, but he dulls the weapon which he places in his agents' hands by expressing the belief that the rate making shall be done by promulgating a series of maximum rates on complaint. To prevent discrimination below the maximum rate he suggests that the commission may seize upon a discriminatory low rate and make that the maximum, thereby terrifying other evildoers and those disposed to be evil. This portion of the President's message, which is really the unfinished business of his first utterance on Federal rate regulation, is clever in evading some of the obstacles which have been shown, but offers no reason for believing that it can accomplish much. The British Railway & Canal Commission has been fixing maximum rates for some years without any really appreciable effect on the way traffic is handled. On the principle of the rebate and discrimination the President is much more convincing, and makes his idea stand forth sharply: "The law should make it clear so that nobody can fail to understand that any kind of commission paid on freight shipments, whether in this form or in the form of fictitious damages, or of a concession, a free pass, reduced passenger rate or payment of brokerage, is illegal." He also calls specific attention to the desirability that the accounts of common carriers should be absolutely open to the inspection of the government, in which we heartily concur. If we may be permitted to look ahead somewhat, we are inclined to prophesy that the portion of the President's address which deals with the strict matter of rate making and which started the extraordinary campaign of education that has been going on ever since the Esch-Townsend bill was brought forward, will produce results exceeding small, while his frank efforts to promote corporate honesty and straight and open dealing will bear fruit out of all proportion to any railroad legislation the country has ever had.

The Cincinnati, Hamilton & Dayton Railway Company was formed in 1895 as a consolidation of the Cincinnati, Hamilton & Dayton Railroad, the Cincinnati, Dayton & Ironton, and the Cincinnati, Dayton & Chicago. The Pere Marquette Railroad was organized

in 1899 for the purpose of consolidating the Flint & Pere Marquette, the Detroit, Grand Rapids & Western and the Chicago & West Michigan railroads. The Chicago, Cincinnati & Louisville Railroad is a consolidation effected in 1903 of the Cincinnati, Richmond & Muncie and the Cincinnati & Indiana Western railroads with a projected line from Cincinnati to Chicago (282 miles) most of which has been completed. In July, 1904, the Cincinnati, Hamilton & Dayton Railway acquired control of the Pere Marquette through purchase of 11/16 of its common stock. These two companies then proceeded to acquire jointly the entire outstanding capital stock of the Chicago, Cincinnati & Louisville. In January, 1905, the Cincinnati, Hamilton & Dayton leased for 99 years the Ohio rights and property of the C. C. & L., and also secured the common use of its lines in Indiana, by guaranteeing the C. C. & L. bonds, assuming maintenance of the property in Ohio, and agreeing to pay its proportion of the cost of maintaining the lines in Indiana used in common. In March, 1905, the C. H. & D. leased the Pere Marquette for 99 years, the lessee to assume all obligations of the Pere Marquette and to pay as rental 4 per cent. dividends on its \$12,000,000 preferred stock and 5 per cent. dividends on its \$16,000,000 common stock. In April, 1905, the Pere Marquette assumed the entire capital stock of the Toledo Railway & Terminal Company. This is a rough outline of the corporate history of this much bought and sold property, embracing 3,099 miles of line owned and 3,668 miles as the total operated, between Buffalo and Ironton on the east, Petoskey, Bay City, Ludington and other Lake Michigan and Lake Huron points on the north, Chicago and Springfield, Ill., on the west, and Cincinnati and the Ohio river on the south—a system reaching a number of excellent traffic points in a comparatively small territory, but under highly competitive conditions and with no through outlet.

Having considered the position of the Great Central route made up of these properties in their central territory, as they existed prior to any outside interference, observe how they got their through traffic outlet, and what became of it. The Erie Railroad reaches the Cincinnati, Hamilton & Dayton, or the Great Central system, at Buffalo, at Chicago and at several points in between. The Erie directors in September, 1905, authorized the purchase of a majority of the capital stock of the Cincinnati, Hamilton & Dayton. This purchase was made through J. P. Morgan & Co., who bought through H. B. Hollins & Co., the Erie obtaining funds through the sale of its \$12,000,000 convertible bonds, which had been authorized for

general improvement work. As described in the *Railroad Gazette*, September 22, the respective syndicate operations on the C., H. & D. property, which need not be detailed at this time, steadily raised the prices of the stock to \$160 a share, which the Erie is understood to have paid for the majority of it; a price far too high. Now comes the dissatisfied Erie shareholder, who asks sharply about the bargain which his road has made with Mr. Morgan. Thereupon Mr. Morgan, perhaps acting under a species of coercion, following the inspection of the road, takes the property off the hands of the Erie, and an announcement is made that the \$12,000,000 bonds will be released for the Erie improvements for which they were originally intended.

When the dust had cleared away it was apparent that several syndicates had made an excellent profit, that the Erie had had a bargain which it did not want, taken off its hands, and that Mr. Morgan has assumed control of a very much over-capitalized property. Announcements at once followed that a receivership had been asked for, and it is probable that the C., H. & D. finances can be very much improved in this way in a short time. It is certainly fortunate for the Erie that it need no longer be concerned with keeping this property out of insolvency. Perhaps no single individual has been more unfortunate in his relations with this tangled matter than Mr. Russell Harding, a strong and efficient railroad officer, who resigned as Vice-President after the property went into Erie hands because there was no apparent place for him in the reorganization, and who, owing to his natural relations with the several successive syndicates, is probably placed in an unfortunate light with the present management. Mr. Harding was exceptionally well qualified for the difficult task he undertook, and it will be hard to find a successor.

THE BAKER BRIDGE COLLISION

A feeling of shame is uppermost in reading the account of the Baker Bridge collision on the Fitchburg division of the Boston & Maine Railroad. There is despair, too, for the simple statement of fact that an engineman has run, with speed unchecked, past two warning and three danger signals, which he saw, shakes our confidence in the fidelity of men and in the value of warning signals. There is also indignation that an engineman of from four to five months' experience should be chosen to drive a fast express. Lyons was a good fireman. His record in that position was clean, and he knew the road—the division on which his work as an engineman was begun only last July. He had the information. He had passed the required examination, but, without any reasonable test of his mental capacity for that peculiar kind of responsibility needed in running fast trains safely, he was put in charge of a heavy fast express. The result was, not what might have been expected, but what might have been feared and guarded against by those who know that implicit obedience is a talent, and that the mental capacity for doing the same thing over and over again, thousands of times, is a higher talent and one that is essential in safe running at high speed.

At first sight, the cause of this accident, the running madly by signals set at danger, impairs our confidence in block signals. The case is singularly like the Westfield disaster, and we need to refer to that in considering the present one. The engineman who ran to Westfield was firm in the belief that he had a ten-minute time interval. His injector choked, his water was running low, and while he was turned from the window adjusting the injector, he became interested, lost count of time and forgot to look. The knowledge which he supposed he had of the time interval was the cause of his undoing, although he was running on a space-interval block-signalized road.

At Baker Bridge time interval signals were the only ones used. At each station, or position, where a man is permanently placed, a green signal is displayed for ten minutes after the passage of each passenger train. The fuseses dropped on the track by the passenger train ahead of Lyons were adjusted to burn ten minutes. A possible ten minutes meant to Lyons, at the pace he was making, a space interval of six miles, so he kept a-going, watching, as he says, for the tail lights of the preceding train. Indeed, it is quite possible that he mistook a red tail light for another one of those fuseses to which he had become accustomed. There is no limit to the absurdities which will creep in the mind of the engineman who allows himself to be influenced in his action by a belief that the interval between himself and the train ahead can be measured by time instead of by space.

There is nothing in the cause of the disaster at Baker Bridge, or at Westfield, to indicate that block signals and good

discipline may not secure full measure of safety in following trains. There is no occasion for hysteria, for the demand for automatic stops, or for a third man in the cab, which is always made in times like this. They are wrong in principle. There is nothing to indicate that manual block signals, in either case, would have worked more for safety than automatic block signals. The accident at Mentor, on the Lake Shore road last July, would probably have been prevented by rail-circuit automatic signals, connected to indicate the position of the turn-out switch.

But block signal indications are useless unless they are obeyed. The British driver slows down when he sees the caution, and stops when he sees the stop—every time—and he does it every working day for thirty years without error. He is economical, saves money, has ambition simply to do his duty, hold his job and leave some money for his wife and children. Inspectors, station masters, gangers (track foremen)—every man on the line is watching. Running over signals is unforgiveable, and the man who does it may go to the poor house. We examine enginemen for eyesight, knowledge of the road and the machine, and then give them a run. So far this is good, and we are not saying that division superintendents are lacking in doing their level best in trying to get discipline. The fault seems to be in method, not in their lack of zeal and hard work.

An automatic attachment to signal posts is a system of automatic discipline, for it records for the information of the superintendent every time a train passes a signal at danger. Its cost and maintenance cost puts it out of the running, but it is a field for inventive genius.

"Surprise checking" is a method of testing the alertness and faithfulness of enginemen, and other men, which has had some astonishing results. It has detected and stopped practices liable at any time to produce accidents. But few roads have adopted this measure in a business-like way. The same principle, inspection without notice, is applied in securing honesty, politeness and neatness. Experience at home and abroad indicates that systematic close inspection is the only way to maintain discipline. This is true of insurance company officers, banks, trust companies—officers as well as employees of all corporations.

It needs to be recognized that in the present state of the art, on many roads, under certain circumstances, the "permissive system" is necessary in order to avoid delays. For example, a heavy train on an up-grade may well pass a red if it keeps its speed down to about five miles an hour, and so avoid being stalled. This simply illustrates that to all rules there are exceptions, but the rule for the engineman, "Thou shalt not pass the red," should have but few and carefully guarded exceptions.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers is holding its annual meeting this week. This is the event of the year for the society, and should be for the mechanical world of the country. The standing of the society is, we suppose, high among foreign associations, including as it does, among its members, men who have done the best work along their own lines that have been done anywhere. It is a pity, however, that an association that should be representative of the very best work of the country, and whose proceedings should be regarded as the embodiment of all that is most valuable, should stand so low in the estimation of many of its own members. As a matter of fact, the proceedings are generally regarded as of little or no value, and many members continue their membership more because they think that there ought to be such an association than because they think it is in any way advancing their own interests or doing much or anything to advance the prestige of the American mechanical engineer. It seems to be a lamentable fact that the management fails to enlist the interest of members who are capable of writing valuable papers or make contributions to the proceedings in the form of discussion.

It must not be understood, of course, that there is absolutely nothing of value in the line of rather bulky volumes that the society has been issuing year after year. Here and there some paper stands out like an oasis in the desert, but the great bulk of what has been published has been profitable chiefly to the printer who prepared the work. Back volumes are crowded with abstruse mathematical calculations that no one reads or studies, or "write-ups" of some new device, of more or less value, whose designer has been shrewd enough to secure its free advertising in the proceedings.

There must be some reason for this lack of interest, and one explanation of it may be found in the wide diversity of interest of the

members. They may all be experts along their own particular lines, but large as the society is, it apparently does not number any great body of men who are experts on the same subject. The result is the discouraging one to an author, that if he prepares and presents a paper of value, the chance of its receiving an adequate discussion is very slim. In fact, throughout the whole range of the society's proceedings it is seldom that the discussion is worth the paper it is printed upon. In this respect the society is working under a great handicap as compared with its two great rivals in the railroad field. There everything that is presented falls under the eyes of experts, and is discussed by them in a manner that develops and establishes the ideas of the writer so as to give them the stamp of approval, or they are submerged beneath an ocean of adverse criticism from which they cannot arise; or as an alternative, they are posted for further investigation and report. Such treatment could not fail to produce the fruits that it has, namely, a line of proceedings that outrank in practical value those of any other associations of the world. The same holds true, in a smaller way, of the railroad clubs.

When the American Society of Mechanical Engineers decided to hold its meeting in Saratoga in June, 1903, a hope was expressed by many that a lesson would be learned and a hint taken from the two great railroad associations in session there at the same time and that some of their life and vigor would be infused into the more sedate, if not more dignified, body. That an impression was made, there can be no doubt, but it is to be feared that the impression was fleeting. One of the past presidents as he walked through the supplymen's exhibit, after attending one of the technical sessions, said that he had heard of these meetings, but had no idea that "they were like this." The mechanical engineers found themselves overshadowed so thoroughly that few knew that they were there, and the regrettable part is that their meetings were neglected and unattended by their own members whose interests led them in anyway towards the other associations.

A lamentable weakness is found in the fact that the precedents of the society forbid it to do anything. It never has done or approved of anything, and, therefore, it never should or will. The reason for this attitude is impossible to understand. Why, if a thing is good or a practice is the best that is known, a great society should not have the courage to give it the attest of its approval, is "one of those things that no fellow can find out." There is no inducement for an individual or a committee to do any work toward the establishment of a standard of construction or practice with the full knowledge of its fate starting out, and the certainty that the matter will receive a desultory consideration and then be dropped. Men like to achieve results, and not have their hard work wasted.

The success of any association depends upon the enlistment of the interest of its members, and this can only be done by getting them to work for the organization. But men will not work for a reward bound up in a page in a volume of dry proceedings. They want their work indorsed or condemned, and until this association will gird up its loins and have the courage of its convictions to say that a thing is good, bad or indifferent, it is to be feared that it will continue in the same uninteresting and valueless rut that has characterized its past.

To criticize is easy, to suggest a remedy is quite another problem. A few years ago a committee of members who were dissatisfied with the general conduct of the society's affairs made an attempt at a regeneration. Although they succeeded in killing an obnoxious measure that was the immediate target of their efforts, they received such half-hearted support from the great mass of the membership that after the meeting they met no more, and matters were allowed to go on in the old way, excepting perhaps for the introduction of some minor reforms in expenditure. The society exists, or should exist, for the purpose of promoting the interests of the American mechanical engineer, and this it certainly is not doing to any marked extent. Its regeneration is in its own hands, for certainly the outsider will not exert himself in the matter. The pity is that there does not seem to be any one who takes enough interest in its existence to stir up an interest in others, and thus make the society what it ought to be—an institution of high value to itself and to the country. The only positive recommendation that can be made is the suggestion that an examination be made into the ways and methods of the railroad clubs and associations, and a lesson be taken in the means adopted to maintain interest not only in the presentation of papers but in the adequate and thorough discussion of them, with final official approval or disapproval of what has been offered for consideration.

"Shop Kinks."

Labor, time, and power saving devices, commonly known as shop kinks, of which a number are found in almost every progressive railroad shop, have much to do with the efficiency of the shop. In many cases with them the time for doing a certain piece of work is reduced as much as from 50 per cent. to 75 per cent. A number of these devices are suggested by, and in many instances have been designed complete, by the mechanics in the shop, but it is seldom that those "higher up" ever credit these men with the origin of any of the kinks. When they are questioned as to who designed such or such a device they invariably answer, "Why, I got that up." Foremen, master mechanics, and even those in higher positions, in many cases seem to be afraid to acknowledge that those under them are endowed with any originality whatever. It would be far better if the feeling were different and instead of trying to hide the origin of such meritorious devices that do originate with the mechanics, they would openly proclaim and credit those with whom such devices originate. This would greatly tend to encourage the practice of originating time and labor saving devices, and at the same time it would produce a better feeling among the mechanics, who, it must not be forgotten, are human and who appreciate "fair play" as well as others who are fortunate enough to hold better positions. From the mere fact that a saving of from 50 per cent. to 75 per cent. is gained by the use of some of the devices it shows that they are of no little importance, and this being the case it seems strange that a record of such devices should not be more generally kept. As a rule, no drawings or records are kept of shop kinks. Rough sketches are made, but these are destroyed as soon as they have served their purpose. More often, however, no sketches whatever are made; the devices are simply made from verbal instructions and, if satisfactory, all well and good; and if not, nothing is said. In many cases devices which have increased the output many times in the shops where they are used are not even heard of in other shops of the same railroad. It seems strange that the mechanical departments do not pay more attention to such details as these. If a device saves from one-half to two-thirds of the time for doing a certain piece of work in one shop why should it not save the same amount in another shop doing practically the same work; and, again, why is it not worth while to see that it is adopted in all of the shops of the entire system? There is no reason why it should not be done, nor is there any reason why a good device used in any one railroad shop should not be used in all railroad shops. Unlike commercial shops, there is practically no competition in shop work among rival railroads, so that a general interchange of designs of good shop kinks would be beneficial, and would tend to increase output. It is common for railroad shop foremen, and even for machinists, to say that they would like to visit other railroad shops, and see what methods are employed for doing a certain piece of work. When asked why they do not go, they answer that they cannot afford to lose their pay. In other cases they answer that the management does not care to have them lay-off.

The practice of letting the men visit other shops should be encouraged. Commercial shops encourage and pay their shop foremen and others of their shop force to visit the shops of their competitors and study their methods, so why should it not be equally advantageous for railroads to do the same? Suggestions picked up by the men on such visits would often greatly increase their earning capacity and would pay for the expense incurred many times over. It is true that the master mechanics and those "higher up" exchange visits, but it is very seldom that a shop or gang foreman is allowed to take a day off for the purpose, unless he does so at his own expense. Yet they are the ones who come in actual contact with the work and they are more apt to notice details than is the master mechanic, whose time is pretty well occupied with a multitude of details; with correspondence and office work. The *Railroad Gazette* has endeavored to help shop men by descriptions of shop kinks from time to time, and is always glad to receive and to publish contributions of this kind.

The news from a number of state capitals during the past week or two has contained a variety of instructive items illustrating the science of rate making by the State. In Virginia the Corporation Commission has been listening to a "brilliant array of counsel" who have argued against a rule reducing to 15 cents the minimum charge for a single shipment of freight. The three principal roads of the State are strenuously objecting to the rate as inequitable and oppressive. The discussion here reported is, evidently, only a preliminary skirmish, as the "actual argument" was to begin December 5. While the objections to these rates are undoubtedly well founded, the railroads may have the consolation of reflecting, in case they are defeated, that many a road in other states has had to make this reduction without a murmur because of the rise of a trolley line alongside the railroad. In Kentucky an inquiry has been begun by the Railroad Commission which in its magnitude makes a 15-cent dispute seem small in the extreme; it is proposed to do nothing

less than gather, *de novo*, everything worth knowing about all the railroads of the state; and after a brief preliminary hearing each company has been favored by the commission with a list of 42 questions which, it seems likely, will require 42 weeks to answer; and the Louisville & Nashville, apparently looked upon as the chief sinner, is asked many more. The railroads claim that their rates in Kentucky at present are reasonable and that there is neither a general demand for reductions nor any legitimate agitation of the subject; and, so far as can be judged from what the newspapers tell us, the attitude of the railroads is correct. Oklahoma is in the happy position of having a law, the Noffsinger Demurrage Law, which was intended to punish the railroads but which the shippers say is unnecessary. Under Mr. Noffsinger's proposition, the railroads are penalized a dollar a day per car, more or less, in case they are unable to furnish cars as asked for by shippers; but, says a prominent grain dealer, who has corn piled high on the ground along the tracks of the Santa Fe road, "What would be gained by applying the law? One might as well sue a hotel for not furnishing him a room when all the accommodations are taken." In other words, the railroads are using their whole stock of cars in the most expeditious manner possible. In Ohio the drummers are so exercised over the fact that the roads of Michigan are furnishing a more convenient interchangeable mileage ticket than that of the Central Passenger Association, south of Michigan, that they propose not merely to invoke the power of the State to whip the Central Passenger Association into the traces, but they are going to mass a battery, so to speak, of three States. They have called a conference to be held in Chicago this week, at which they expect to have present the governors of Michigan, Indiana and Ohio.

The Signal Engineer of the Union Pacific, Mr. A. G. Shaver, is inquiring about the practice and views of other signal engineers in the matter of setting signals in yards where there are side tracks, necessitating either moving the sidetrack out so that the signal can be set adjacent to the main line, or using a bracket post. Mr. Shaver favors moving the sidetrack out to a distance of seventeen feet (centers) from the main track unless there is some unusual obstacle. He finds that it is difficult for trainmen and engineers to understand the meaning of a bracket post. He holds also that if a bracket post must be used there should not be more than one blind doll; that is, a signal should not be removed farther away than across one track. We suspect that Mr. Shaver will find most of his correspondents in the position of the Maine man on the prohibitory liquor law—in favor of his theory, but ag'in its enforcement—unless the cost of moving out the sidetrack can be made very small or else concealed under some other account. There are many main line signals, no doubt, which are set outside of side-tracks and not put on bracket posts; and which have been in successful use for years. This arrangement is now admitted to be theoretically wrong, but in practice it is justified by the unscientific, though often comforting, doctrine that "a signal means whatever the superintendent says it means." That many superintendents have carried out this idea all right with a simple semaphore, without a doll, while the Union Pacific superintendents have difficulty in making a bracket post mean what they say it means, must be attributed to the innate depravity of engineers. Perhaps on the Union Pacific the trouble is with the "doll"; one with winking eyes and real hair might be an improvement. Seriously, however, we think that the doll would fulfill its function much better if it were somewhat larger—more like a full-size semaphore post—and if at night it carried something better than a blue light. In other words, it should be made more important both by night and by day. There would still remain the question whether it was of any use. The practice of those roads which have for a dozen years used plain semaphores set 10 ft. or 15 ft. outside the ditch, tends to show that the bracket is not worth much—has only theoretical virtue. Mr. Shaver might do well to inquire (of roads using brackets for single signals), how many cases there have been of engineers going wrong because they did not apprehend the information that the doll was intended to convey to them.

NEW PUBLICATIONS.

Year Book of Legislation: Issued by the New York State Library, Albany, 1905. Price, \$1.

This is a book an inch and a quarter thick containing three bulletins issued this year by the Library, containing (bulletin No. 23) a digest of governors' messages of the year 1904; (bulletin No. 24) a summary and index of legislation of the same year, and (bulletin No. 25) a review of legislation. All of these documents have been edited by Mr. Robert H. Whitten, Sociology Librarian. The matter in the messages of the governors (of all the states of the union), including the President's message, is briefly digested and topically arranged. The index of legislation gives data concerning 2,190 laws and constitutional amendments, all elaborately classified. The items are classified and numbered so that the reader can by the numbers follow a subject from year to year in successive

indexes, and the numbers are so arranged that it is easy to refer from the governors' messages bulletin to that on legislation, and vice versa. The third bulletin, the review of legislation, is made up of monographs by 40 specialists, each reviewing the year's progress in one particular field. All of the work appears to have been done by careful hands and the Year Book thus furnishes a useful guide to the legislation of the year throughout the whole of the United States. Each of the three bulletins is well indexed and there is at the end a 40-page index of the whole.

TRADE CATALOGUES.

Books Relating to Railroads and Steam Navigation.—The "Railroadiana," a pamphlet published by Edward Baker, contains the names and prices of upwards of 1,500 books, pamphlets, maps, guides, time-tables, etc., connected with the origin, rise and development of both American and foreign railroads. These books, which have taken over 20 years to accumulate and which include many items which it would be impossible to duplicate, are for sale at Edward Baker's "Great Book Shop," 14 and 16 John Bright Street, Birmingham, England. A chronicle of books relating to steam navigation, the navy and allied subjects is also published by Edward Baker.

Electric Emery Grinders.—A new heavy stationary emery grinder, made by the Stow Mfg. Co., Binghamton, N. Y., is illustrated and described in a neatly gotten up folder issued by the above company. "Semi-Portable" might be a better name for this machine, inasmuch as by simply loosening a few bolts it can be readily changed from one place to another without regard to countershafts or line-shafts. It is driven by a multispeed motor, and two wet or two dry wheels can be used, or a dry wheel can be placed at one side and a wet wheel at the other side of the motor.

Steam Shovel News.—The current issue of this magazine, which is No. 5 of Vol. I, has 14 pages of interesting matter pertaining to its limited field. Some interesting steam shovel performances are illustrated from photographs and described, and the opening article enumerates some of the large engineering works of the near future. The issue of the magazine bi-monthly is announced, beginning with this number, with the expectation of later making it a monthly publication.

The Los Angeles Limited, a new train to be put in service on Dec. 17 by the Chicago & North-Western, Union Pacific and San Pedro, Los Angeles & Salt Lake roads, is announced on handsomely engraved cards in script, giving a brief description of the equipment and service and a condensed schedule. The train is to have an observation and a dining car, news bulletins, and all the latest "attractions." The time through Chicago to Los Angeles is about 68 hours.

Water Lifted by Compressed Air.—A general idea of the possibilities of compressed air for pumping water is given in a catalogue which is being distributed by the Ingersoll-Sergeant Drill Co., New York. The theory of the air lift is explained and a number of line and half-tone illustrations show the arrangement of wells and piping which are necessary for its operation. The economy derived from this method of lifting water is also briefly discussed.

Steam Hoisting Engines.—Single-drum, two-drum and three-drum hoisting engines made by the C. W. Hunt Company, West New Brighton, Staten Island, N. Y., are illustrated and described in detail in a neatly gotten up catalogue issued by the above company. Illustrations of a number of interesting hoisting arrangements, including hoisting masts and elevators of both wood and steel construction, are also shown.

The Pennsylvania Special, the 18-hour New York-Chicago train of the Pennsylvania Lines, has been set to music by the well-known bandmaster, F. N. Innes, in a march dedicated to Samuel Moody, General Passenger Agent. A presentation copy of the piece may be had by sending four cents for postage to Pennsylvania Lines Advertising Bureau, 702 Union Station, Pittsburg, Pa.

Motor-Driven Air Compressors.—Stationary and portable motor-driven air compressors for both continuous and intermittent service made by the National Electric Mfg. Company, Milwaukee, Wis., are illustrated and described in a neat folder which is being distributed by the above company.

Drills and Chucks.—The "Rich" flat drills and drill-chucks are illustrated and described in a pamphlet issued by the Geo. R. Rich Mfg. Co., Buchanan, Mich. These drills are of high-speed steel and are capable of operating at high speeds and heavy feeds in hard and tough materials.

The Union Pacific.—The passenger department of the Union Pacific is distributing reproductions of a crayon drawing of "The Oldest

Inhabitant on Line of Union Pacific"—a magnificent buffalo. The print, which is 20 x 24, is in rich brown tones and is unmounted for framing.

Drop Forgings.—A neat and interesting pamphlet containing a historic sketch of Geo. H. Corliss, the inventor of the Corliss engine, is being distributed by Wyman & Gordon, Worcester, Mass., makers of drop forgings.

CONTRIBUTIONS

Foolish Graft.

Richmond, Va., Nov. 25, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I herewith attach a proposition which is one of several which has come to us and which stripped of all trimmings is simply a bribe, pure and simple. As these propositions are being undoubtedly distributed broadcast over the country, and may be the means of starting some man on the downward path, and knowing the attitude of the *Railroad Gazette* on all such matters, I especially call your attention to this and trust you will do what you can to prevent such advertisements going out amongst railroad and other mechanical men.

H. A. GILLIS,
Superintendent, American Locomotive Co.

[Mr. Gillis correctly interprets the following proposition, which is an offer of a gold watch free in return for a trial order for "Electric Belt Dressing," made by the Buffalo Specialty Company, Buffalo, N. Y.—EDITOR.]

APPROVAL REQUEST.

(Place and date)1905.

BUFFALO SPECIALTY COMPANY, BUFFALO, N. Y.

Gentlemen:—Send us, free of charge, one 20-year, Solid Gold-Filled Watch, guaranteed exactly as shown and described on this sheet.

In consideration of said gift, you may ship us on 60 days' trial and approval, a 60-lb. drum of Electric Belt Dressing at your lowest price of 35 cents per lb. F. O. B. Buffalo (amount of bill, \$21.00) with the understanding that after 60 days' trial of the Dressing and Watch we will decide whether we want to keep them or not, and upon said trial and examination if we are not delighted with the watch and the goods we are to return both at your expense. Otherwise we are to pay the bill at the end of said 60 days, and keep the watch, which we understand is a distinct gift, with the first order only. We further agree to observe results closely and if the Dressing proves as you state, to recommend it to our friends when occasion presents itself.

Yours truly,

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To Prevent Accidents.

New York, Nov. 6, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just finished reading the editorial in your issue of November 3, "Where Government Control of Railroads Is Needed," and I want to heartily endorse the stand you have taken.

I admire your courage in coming out in the open and saying what ought to be said, and believe and hope that such words coming from you may do some good. I am satisfied that if an investigation of railroad accidents was made by some expert and disinterested person who had authority to compel the adoption of the necessary remedy (recommendatory authority does not count in this country) that our accident list would be greatly reduced. Indeed, the mere knowledge that such an investigation would be made would help to bring about an improvement.

One trouble about Government inspection would be to get competent men for the salaries the Government (it always expects a man of that kind to work for one-third or one-half of what anyone else does) would pay. You are probably aware that all the fire and casualty insurance companies have inspectors to examine risks and that these inspectors really inspect and recommend protective measures on the part of the insured, and that unless such recommendations are carried out the insurance is cancelled, with the result that the protection is taken before and not after the damage is done. If something of this kind were done on the railroads I believe much good would result. Or if the great systems, especially, had officers to make such inspections, as well as investigation of accidents, who were given titles, authority and salaries which would bring them proper rank and respect, I believe that they could do untold good, and cut the accidents and personal injuries account of the railroad companies in two.

I have for years tried to have our General Manager appoint such an inspector to make investigation of the conditions and accidents on our line, who would report direct to him so that he would know the truth about the matter; for, although some claim departments furnish their General Manager or operating department with brief statements of avoidable accidents immediately after they

occur, the matter is referred for investigation to the very officers who may be at fault, and who would be more than human if they reported against themselves. But what I believe would do most towards preventing accidents would be the education of employees as to the rules and their duties; why the rules are made, and what will probably happen if they are not observed. As an illustration of the ignorance of employees about the most important rules, I investigated last summer a collision, and out of all the men on the two trains who were not killed (and three of them were) there was not one man who really understood and knew what the flag rule was, and surely that is one of the most important rules in the book; and yet these men, with one exception, had been in the service for some years, and if the rule had been complied with and the fuses put out, as the rule required, which was not done, in all probability the accident would not have occurred.

RAILROAD OFFICER.

The Interstate Commerce Commission Bill.

Following the Foraker bill, the Interstate Commerce Commission has introduced a measure of its own to amend the Act to Regulate Commerce of 1887. The first section as amended differs from the original in striking out the clause "under a common control, management or arrangement" in prescribing the common carriers to whom the provisions of the Act shall apply in interstate commerce; also in the important particular that the term "transportation" shall include cars and other vehicles and all instrumentalities and facilities of shipment or carriage irrespective of ownership or of any contract, express or implied, for the use thereof, and all services in connection with the receipt, delivery, elevation and transfer in transit, ventilation, refrigeration or icing, storage and handling of property transported; and it is added that it shall be the duty of every carrier, subject to the provisions of this Act, to provide and furnish such transportation upon reasonable request therefor.

Section 6 of the Act to Regulate Commerce as amended March 2, 1889, to the effect that common carriers must keep open to public inspection their schedules containing classifications of freight, etc., stating separately terminal charges and any special rules or regulations which affect the aggregate of the entire rate, and that these through schedules must be similarly shown by any common carrier subject to the provisions of the Act who receives freight in the United States to be carried through a foreign country to any place in the United States, in lieu of which such goods shall be subject to customs duties as if the freight were of foreign production—that no advance shall be made in charges except after 10 days public notice, that reductions shall only be made after three days public notice, and that rates and charges must be collected as published—that common carriers subject to the provisions of the Act must file with the Commission copies of their schedules and of contracts and agreements with other common carriers; these stipulations, together with the penalties attached for non-compliance, are amended to read as follows:

"Sec. 6. Every common carrier subject to the provisions of this Act shall file with the Commission created by this Act tariffs showing all the rates, fares, and charges for transportation, as defined in the first section of this Act, between points upon its own route and between points upon its own route and points upon the route of any other carrier when a through route and joint rate have been established by agreement or otherwise; and this provision shall apply when the route connecting two points in the United States passes through an adjacent foreign country, and when the traffic is moving to or from any foreign country. Such tariffs shall plainly state the places between which passengers or property will be carried, shall contain the classification of freight in force, and shall also state separately all terminal charges, including storage, and all privileges or facilities which shall be allowed other than those involved in the transportation of passengers or property, as defined in the first section of this Act, in ordinary course between two definite points, and any rules or regulations which in anywise change, affect, or determine any part or the aggregate of said rates, fares, and charges, or the value thereof, to the shipper or consignee. Every such common carrier shall also file with said Commission copies of all contracts, agreements, or arrangements relating to any traffic or transportation affected by the provisions of this Act to which it may be a party.

"The carrier shall plainly print such tariffs in large type, and shall keep posted, for the use of the public, two copies in two public and conspicuous places in every depot, station, or office of such carrier where passengers or freight, respectively, are received for transportation, in such manner that they shall be accessible to the public and can be conveniently inspected.

"No change shall be made in any tariff of rates, fares, and charges filed and published as aforesaid, unless the carrier shall file with the Commission a statement showing such changes and the date when they shall take effect, and shall post new tariffs, as hereinbefore provided, or plainly indicate such changes upon

those already posted, at least 60 days before the taking effect of such changes; but the Commission may, for good cause shown, allow changes upon less than 60 days' notice, and may do this either in a particular instance or by general order applicable to special conditions and species of traffic.

"The names of the several carriers which are parties to any joint tariff shall be specified therein, and each of the parties thereto, other than the one filing the same, shall file with the Commission such evidence of concurrence therein or acceptance thereof as may be required or approved by the Commission; and where such evidence of concurrence or acceptance is filed it shall not be necessary for the carriers filing the same to also file copies of the tariffs in which they are named as parties.

"The Commission may determine and prescribe the form, subjects to be contained in, and arrangement of the tariffs required to be published and filed, as aforesaid, and may change such form, subjects or arrangements thereof from time to time as shall be found expedient.

"The Commission may, in its discretion and for good cause shown, change or modify the foregoing requirements in respect of the publishing, posting, and filing of tariffs, and may do this either in particular instances or by general order applicable to special or peculiar circumstances or conditions.

"No carrier shall, unless otherwise provided by this Act, receive or participate in the transportation of passengers or property, as defined in the first section of this Act, unless the rates, fares, and charges upon which the same are transported by said carrier have been filed and published in accordance with the provisions of this section; nor shall any carrier charge or demand or collect or receive a greater or less or different compensation for such transportation of passengers or property, or for any service in connection therewith, between the points named in such tariffs than the rates, fares, and charges which are specified in the tariff filed and in effect at the time; nor shall any carrier refund or remit in any manner or by any device any portion of the rates, fares, and charges so specified, nor extend to any shipper or person any privileges or facilities in the transportation of passengers or property, except such as are specified in such tariffs.

"Any freight shipped from the United States through a foreign country into the United States, the through rate on which shall not have been made public as required by this Act, shall, before it is admitted into the United States from said foreign country, be subject to customs duties as if said freight were of foreign production, and any law in conflict with this section is hereby repealed."

"Section 13 of the original Act specifies those persons entitled to make complaints and the manner in which these complaints are to be made to the Commission by petition. This section remains practically unchanged except that carriers are included among those who may complain, and it is also specified that the Commission, if required, shall verify the answers made by carriers to charges against them which have been handed them for reply by the Commission.

The crux of the Interstate Commerce Commission's Bill lies in Section 15 as amended. The original Section 15 of the Act to Regulate Commerce reads as follows:

"That if in any case in which an investigation shall be made by said Commission it shall be made to appear to the satisfaction of the Commission, either by the testimony of witnesses or other evidence, that anything has been done or omitted to be done in violation of the provisions of this Act, or of any law cognizable by said Commission, by any common carrier, or that any injury or damage has been sustained by the party or parties complaining, or by other parties aggrieved in consequence of any such violation, it shall be the duty of the Commission to forthwith cause a copy of its report in respect thereto to be delivered to such common carrier, together with a notice to said common carrier to cease and desist from such violation, or to make reparation for the injury so found to have been done, or both, within a reasonable time, to be specified by the Commission; and if, within the time specified, it shall be made to appear to the Commission that such common carrier has ceased from such violation of law, and has made reparation for the injury found to have been done, in compliance with the report and notice of the Commission, or to the satisfaction of the party complaining, a statement to that effect shall be entered of record by the Commission, and the said common carrier shall thereupon be relieved from further liability or penalty for such particular violation of law."

This has been amended to read as follows:

"Sec. 15. If, after full hearing of a complaint made as provided in section thirteen of this Act, the Commission shall determine that any party complainant is entitled to an award of damages under the provisions of this Act for a violation thereof, the Commission shall make an order directing the carrier to pay to the complainant the sum to which he is entitled on or before a day named.

"If, after full hearing of such a complaint, the Commission shall

be of the opinion that any existing rate for the transportation of persons or property as defined in this Act, or any regulation or practice whatsoever affecting such transportation, is unreasonable or unjustly discriminatory, it shall be the duty of the Commission to determine what will be a just, fairly remunerative, and reasonable rate, regulation or practice to be charged, imposed, or followed in the future in place of that found to be unreasonable or unjustly discriminatory, and to order the carrier to observe the same; and in so doing the Commission shall have power (a) to fix a maximum rate; (b) to fix a differential and to prescribe both a maximum and a minimum rate to enforce the same when that may be necessary to prevent discriminations forbidden by the third section, but not otherwise; (c) to change the classification of any article.

"If the rate so fixed by the Commission shall be a joint rate, and the carriers parties thereto fail to agree upon the apportionment thereof between themselves within 20 days after notice of the order fixing the same, the Commission may make a supplemental order declaring the portion of such joint rate to be received by each carrier party thereto, which order shall take effect as part of the original order.

"The Commission may also, after full hearing of a complaint, establish through routes and joint rates and fix the division of such rates and the terms and conditions under which such through routes shall be operated, when that may be necessary to give effect to any provision of this Act, and the carriers complained of have refused or neglected to voluntarily establish such through routes and joint rates.

"If the owner of property transported under this Act directly or indirectly renders any service connected with such transportation, or furnishes any instrumentality used therein, the Commission may, after full hearing of a complaint, determine what is a reasonable charge to be paid by the carrier for the service so rendered or the use of the instrumentality so furnished, and fix the same by appropriate order, which order shall have the same force and effect and be enforced in like manner as the orders above provided for in this section.

"The foregoing enumeration of powers shall not exclude any power which the Commission would otherwise have in the making of an order under the provisions of this Act.

"Every order of the Commission shall fix the date when it is to take effect, and shall be forthwith served by mailing to any one of the principal officers or agents of the carrier at his usual place of business a copy of the report and opinion of the Commission, together with a copy of the order; and the registry mail receipt shall be *prima facie* evidence of the receipt of such order by the carrier in due course of mail."

Section 16 of the original Act provides that the Commission may enforce its orders through petition to a Circuit Court sitting in equity in the judicial district in which the common carrier complained of has its principal office or in which the violation complained of shall have happened; also, that the findings of fact in the report of the Commission shall be *prima facie* evidence in the trial and that the Court may issue a writ of injunction, or other proper process, to restrain the common carrier from disobedience; also, that when the subject in dispute shall be of the value of \$2,000 or more, an appeal may be taken to the Supreme Court, although such appeal shall not operate to stay or supersede the order of the Court or the execution of any writ or process thereon; that these cases are to be prosecuted by the District Attorney and the costs borne by the United States. The amendment to this, constituting the sixteenth section of the bill now presented by the Interstate Commerce Commission, broadens the range of districts in which a complaint may be brought and provides that after service of the petition there shall be pending in the Court a civil suit for the recovery of the damages which shall proceed from then on in all respects like a civil suit for damages for a breach of contract except that the findings and order of the Commission shall be *prima facie* evidence of the facts therein stated, and that the petitioner shall not be liable for costs in the Circuit Court nor at any subsequent stage of the proceedings unless they accrue upon his appeal. If the petitioner shall finally prevail he shall be allowed a reasonable attorney's fee, to be taxed and collected as a part of the costs of the suit. A time limit of three years is set as an outlary period for complaints.

Within 30 days after receiving an order, other than an order for the payment of money, a carrier may begin in the Circuit Court proceedings to vacate the order by filing a bill in equity. If the order of the Commission is vacated by the Court, and if the defendant does not appeal to the Supreme Court, the Commission may reopen the case for further hearing and order or it may make a new order without further hearing not inconsistent with the decision and opinion of the Circuit Court. Upon the filing of such a petition to vacate an order the Circuit Court may extend the time within which the order shall take effect, not to exceed in all 60 days from the date of service of the order upon the carrier. The Court may also, if it plainly appears that the order

is unlawful and not otherwise, suspend the operation of the order during pendency of the proceeding or until the further order of the Court. If no proceedings to vacate an order are begun within the time limit or if the effect of the order has not been suspended in any of the ways provided, it becomes known as a final order, and carriers who knowingly neglect to obey a final order shall forfeit to the United States \$5,000 for each offence, or \$5,000 a day for a continuing violation. The Commission is entitled to apply to the Circuit Court in its own name for an enforcement of an order, and in such a case the Court can enforce obedience by a writ of injunction. It is also provided that copies of schedules and tariffs and the statistics contained in the annual reports of carriers made to the Commission, as required by the Act, shall be preserved as public records in the custody of the Secretary of the Commission and shall be received as *prima facie* evidence of what they purport to be.

A new section is added to the Act to Regulate Commerce following Section 16 and numbered 16A which provides that after a decision has been made by the Commission any party thereto may at any time make application for a re-hearing, to be granted by the Commission at its discretion.

Section 20 of the Act to Regulate Commerce is amended to include the owners of all railroads engaged in interstate commerce as defined in the Act among those from whom annual reports are required. It is also provided that accidents to passengers, employees and other persons shall be reported, together with the causes of them. It is provided that the report shall be for the year ending June 30 and must be filed by September 30 next following, with penalties for non-compliance. The Commission also has authority to require the carriers to file monthly reports of earnings and expenses within a specified period. The Commission may in its discretion prescribe the forms of accounts to be kept by carriers, including traffic movement as well as receipts and expenditures of money. The Commission shall at all times have access to all accounts, records and memoranda kept by carriers subject to the Act, and it shall be unlawful for such carriers to keep any other accounts, records or memoranda than those prescribed or approved by the Commission, which is also entitled to employ special agents or examiners. A severe penalty is laid on any person who shall wilfully make a false entry in accounts, records or memoranda kept by a carrier, or who shall wilfully destroy or by any other means falsify these records. The examiners are estopped by a heavy forfeit from divulging any fact that may come to their knowledge during examination except in so far as they may be directed by the Commission.

Setting Valves with the Walschaert Gear.

BY THOMAS F. CRAWFORD, M.E.

The following method of setting locomotive valves with the Walschaert gear is in use at the Baldwin Locomotive Works:

The first step is to connect all rods and pins with the exception of the eccentric rod. This rod joins the crank pin arm to the base of the link and is left disconnected so that the valve may be moved freely backward and forward in obtaining the various port tram marks on the valve-stem. These are obtained in the

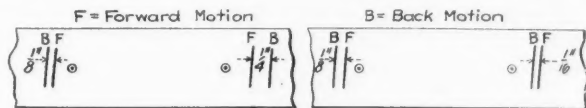


Fig. 1.

Fig. 2.

Tram Marks on Valve Stem.

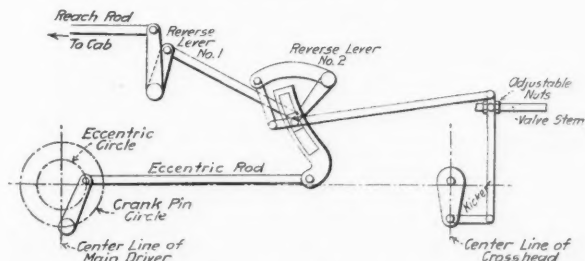


Fig. 3—Walschaert Valve Gear at Half Stroke.

usual manner, as are also the dead center marks on the rim of the main drivers. The engine, in this case a Pennsylvania consolidation, was equipped with inside admission piston valves and was therefore supplied with special holes through the steam chest walls so that the port edges of the valve could be placed exactly square with the admission port edge.

The next step is to connect the eccentric rods on both sides

and proceed to catch in succession the various centers for both the forward and back motions with the usual tram marks on the valve stem. For example, suppose the valve tram marks on the stem are as shown in Fig. 1; the back motion lapping the forward on both ends by the amount indicated. This means that the eccentric rod must be shortened, but the amount is the important question. At present it is customary to subtract the differences between the back and front marks at either end and shorten the rod three-quarters of this amount. Difference at front end, $\frac{1}{4}$ in.; difference at back end, $\frac{1}{8}$ in.; $\frac{1}{4}$ in. — $\frac{1}{8}$ in. = $\frac{1}{8}$ in.; $\frac{3}{4}$ of $\frac{1}{8}$ in. = $\frac{3}{32}$ in. The rod would therefore be shortened $\frac{3}{32}$ in. In another case if the marks were as in Fig. 2 the differences would be added and three-quarters taken. The three-quarters is obtained by allowing one-quarter for lost motion in the pins; this with the one-half required for the alteration adds to three-quarters.

A peculiar feature of the Walschaert motion is noticed at this point when making the above changes. The forward motion is direct and the back motion indirect owing to the fact that the link is stationary. When the link block is at the bottom of the link in the forward motion the eccentric rod acts direct on the valve rod through the block; but when the latter is at the top of the link in the backward motion the link acts as a rocker. After adjusting the forward and back motion in this manner it is still evident that the distance from pop mark to tram mark is not equalized; in other words, the lead is not the same at each end of the stroke. This inequality is adjusted by means of two large nuts which turn on the valve stem and face against the valve stem crosshead. We now have the valves set with the reverse lever in both corners, that is, with a link block clearance of $\frac{1}{2}$ in. at either end.

It is desired, however, to obtain the most perfect adjustment for the position in which the reverse lever will be worked during the service of the engine. For this reason the link block is raised (in this case $6\frac{1}{4}$ in.), and the extreme valve travel is marked. If this varies at either end the valve stem nuts are again adjusted, sacrificing their former equality in order to be perfect at this cut-off.

It is well to mention the fact that the Walschaert motion has constant lead no matter what the cut-off may be. The shop man is therefore relieved from that difficult feature of ordinary valve setting—obtaining the proper lead. When the engine leaves the drawing board it has its lead and this remains unchanged. It is also interesting to note that the "kicker," or portion of the gear attached to the main crosshead, does not play any part in the valve setting. Its sole duty is to open the steam port rapidly at the beginning of each stroke.

From the foregoing description it is readily seen that there is a large amount of time saved in setting a Walschaert valve motion as compared with the Stephenson. In one observed case, with the ordinary run of luck it required four men 65 minutes to complete the whole operation. This included taking the left eccentric rod to the smith fire to be shortened $\frac{1}{32}$ in. In this gang two men barred wheels, one man trammed the main drivers, and the other worked at the valve stem.

The above engine had the following dimensions:

Valve travel	6 in.	Cut off	$\frac{1}{2}$ stroke
Stroke of pistons	28 in.	Lead	3-16 in.
Diameter of cylinders	22 in.		
Outside lap	$\frac{1}{8}$ -in. neg.		
Inside lap	$\frac{7}{8}$ in.		

Foreign Rails for Harriman Lines.

The Harriman lines are about to receive a large order of foreign rails. Twenty-one thousand tons, the contract for which was placed during the early part of November with Spanish mills—the Altos Hornos de Viscaya—are intended for use in California. The contract price for the rails, delivered, including import duty, is around \$27 a ton. The prevailing price for domestic rails at the mills is \$28, and to carry them to the Pacific Coast the total cost would be almost \$38. Delivery of the Spanish rails is to be completed by January next. Five thousand tons are now on their way by chartered steamer to Galveston, Texas, and the balance will be shipped to San Diego, Cal.

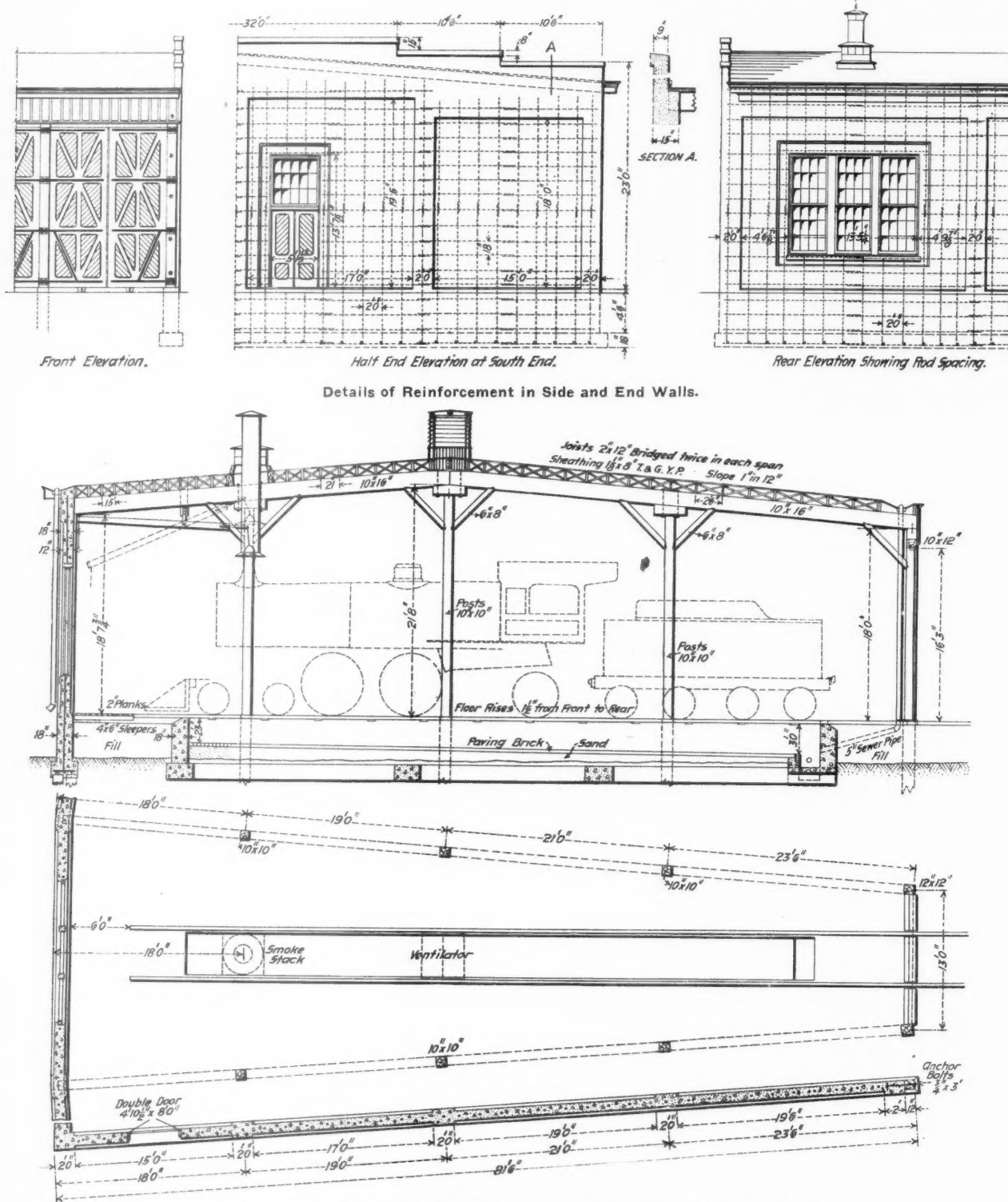
For the Southern Pacific's extensions in Mexico a rail contract has been placed with the Monterey Iron & Steel Company. The closing of this contract with a Mexican concern is due largely, if not entirely, to the recent tariff imposed. The Mexican price was around \$33 a ton, whereas the existing quotations for American rails laid down in Mexico is upwards of \$40, the duty being \$10 a ton, while the freight charges, etc., are almost \$5. Another Mexican road desired to secure a lot of 14,000 tons of rails from the Monterey people, but it was found impossible to supply them within any reasonable time, as the Monterey mills will be busy for some time to come on the Southern Pacific contract. The order has therefore been placed with the Altos Hornos de Bilbao, one of the principal mills in Spain. The price is a shade above \$22

a ton f.o.b. Bilbao. Of course, these rails will also have to pay duty according to the existing Mexican tariff, which, with freight charges, will mean that they will cost about \$35 a ton delivered, or \$5 a ton less than the prevailing price for American rails laid in Mexico.

Private advices from Mexico are to the effect that it is confidently expected that the import duties on rails and other steel

Reinforced Concrete Roundhouse for the Wabash.

The Wabash has under construction in its Landers yard, Chicago, a 20-stall reinforced concrete roundhouse, drawings of which are shown herewith. The side and rear walls of the building are reinforced concrete, the partition and pit walls are plain concrete and the roof is gravel. All walls, both building and pit, rest on



Cross-Section and Part Plan of Reinforced Concrete Roundhouse—Wabash Railroad.

material entering that country will very shortly be largely reduced if not practically removed. The Mexican Government authorities are understood to have decided to order a sweeping revision to be made in the existing tariff with a view to encouraging railroad building, which is now largely hampered owing to the heavy import duties, the Mexican plants being able to supply only a pittance of the big quantities required.

piles 18 ft. long, except the piles in the rear building wall on the pit center lines, which are 12 ft. long. The roof-supporting columns each rest on a single 20-ft. pile. The wall footings are 18 in. deep and 3 ft. wide. For 4 ft. 6 in. above this, or up to the rail level, the thickness is 18 in., reducing to 12 in. for the remainder of the height, except at the cornice where there is an increase to 15 in.

The drawings show the arrangement of the reinforcing steel

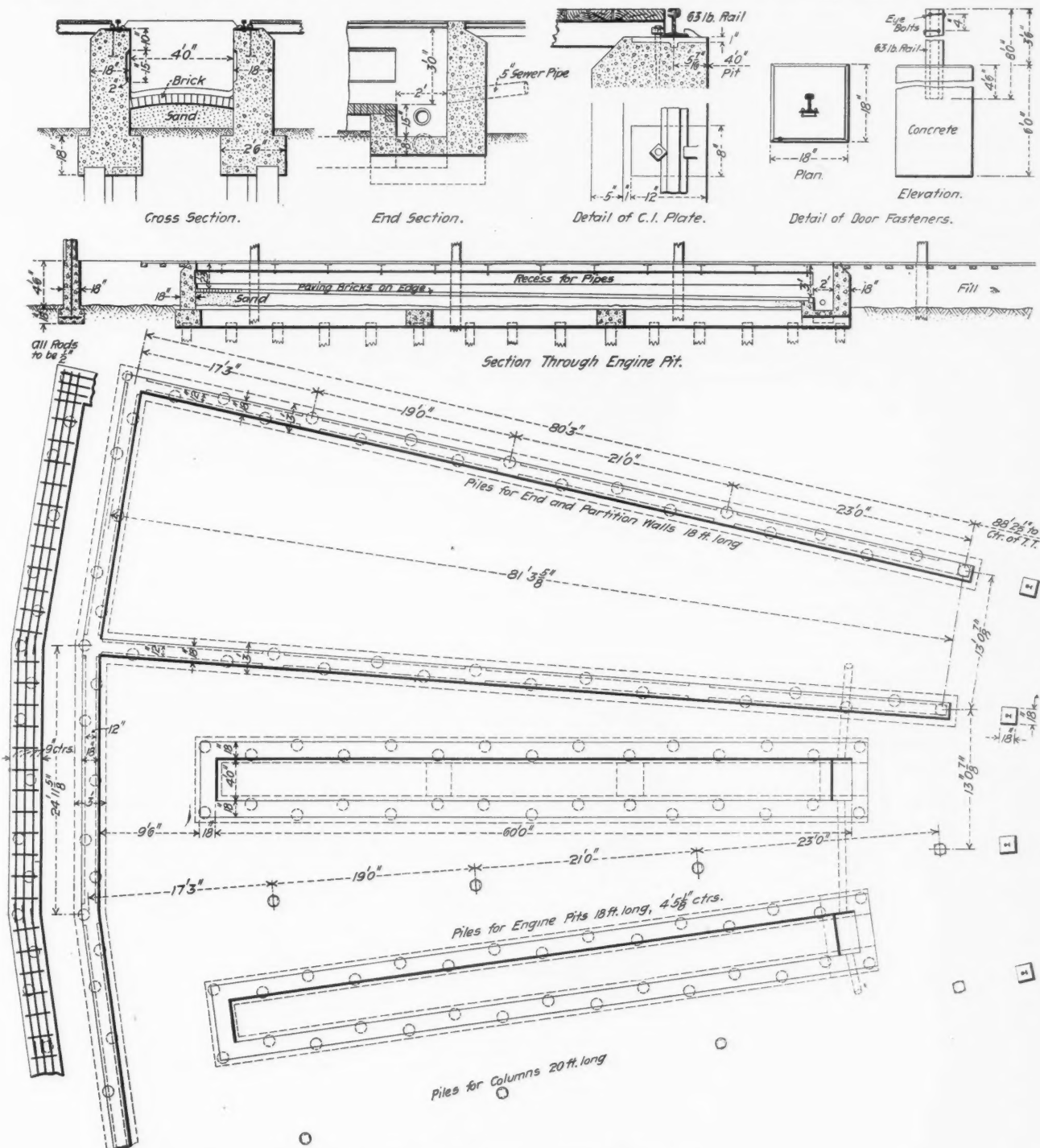
rods, which are Johnson corrugated bars, $\frac{1}{2}$ -in. throughout except above the windows, where they are $\frac{3}{4}$ -in. In the footings three parallel longitudinal rods, 9 in. on centers, are laid directly on top of the piles. Short bars 2 ft. 6 in. long are laid transversely to these, the spacing varying from 18 in. to 24 in. In the walls, all horizontal rods are spaced 18 in. on centers, and the vertical rods vary the same as the transverse foundation rods.

The piles supporting the pit walls are staggered, and are 4 ft. 5½ in. on centers. The footing and wall dimensions are the same as for the corresponding courses in the building walls. The pit

Above the center of each pit is a louvre ventilator. Dickinson combination cast-iron smoke-jacks and ventilators are used. We are indebted to Mr. A. O. Cunningham, Chief Engineer of the Wabash, for the plans.

Foreign Railroad Notes.

The reformed passenger tariff now under discussion in Germany allows no free baggage, while at present in Prussia and Saxony the passenger is allowed 55 lbs. free, besides what he may take



Details of Engine Pits and Foundations.

floor is paving brick laid on edge on a sand bed and grouted. The rails rest on cast-iron plates bedded in the top of the wall and spaced 5 ft. on centers. A detail of this feature is shown. A detail of the door fastener also is shown. It consists of an 8-ft. length of 63-lb. rail bedded in a concrete block 18 in. square and 6 ft. high. The top of the block is flush with the ground, the rail projecting 3 ft. 6 in. above. The door is fastened to the latter by hooks.

with him in the passenger car. A great deal of opposition to this abolition of the free-baggage allowance is manifested, especially among commercial travelers. The proposed charges for extra baggage are less than heretofore, yet amount to about \$5.70 for a trunk weighing 150 lbs. (our free-baggage allowance) for a distance as great as that between New York and Chicago. In answer to this complaint the interesting fact is cited that on the Prussian State

Railroads in 1903 only about one-seventeenth of the whole number of passengers had any baggage in the baggage cars; the average weight of baggage so carried per passenger having been 3¼ lbs. This is offered in evidence that the free-baggage privilege benefits comparatively few passengers. Doubtless a much larger proportion of passengers in this country have trunks checked; but this is not a fair comparison; for the construction of passenger cars in Germany (and the rest of Europe) permits carrying large quantities of baggage in the car with the passenger; and this privilege, which is not interfered with by the proposed reform, is utilized to the utmost, and often abused.

The Austrian Railroad Ministry has announced that beginning with next January 9½ hours will make a day's work in the State Railroad shops, instead of 10 hours, as heretofore. Work will begin at 7 a.m., and there will be 1½ hours intermission between forenoon and afternoon.

From Japanese sources it is reported that the Chinese Eastern Railway has been destroyed or crippled in so many places by the Russians that a year and a half will be required to put the line in good working order.

The Coal Carriers.

BY FREDERICK E. SAWARD,
Editor of the *Coal-Trade Journal*.

While the ton-mile rate from coal is small, compared with most freight, the tonnage is so readily taken care of, and it is handled in such bulk, that the profit yield in the aggregate is large. Anyone who takes up the reports of the principal hard and soft coal carriers will readily acknowledge this fact, and there is a reason which may not have occurred to many a reader. The coal is vastly important to a carrier from the fact of the great yield from a given territory. It is for this reason that the several lines of road, even those not particularly classed as coal roads, endeavor to secure territory from which tonnage can be had.

In bituminous coal regions, for instance, the average amount of coal to an acre of land is over 5,000 tons. In some sections where the seams are very large or where there are several workable seams on the same property the amount of coal will be two or three times this, but putting the average amount of available coal to an acre as 5,000 tons, and contrasting it with the freight created, for instance on cotton or corn land, we readily see the reason why railroads are struggling to get into the coal regions of the country. On cotton land the usual average yield per acre is not much more than one-third of a bale, which, with the seed, would make about 500 lbs. of freight, or one-quarter of a ton. On this basis it would take an acre of corn or cotton land 20,000 years to furnish as many tons of freight as one acre of coal land. In this comparison no account, of course, is taken of the development of other traffic, freight or passenger, in either case.

While we have used in this comparison an acre of cotton land, an acre of wheat land would not show very much difference, the average yield of wheat for the United States being about 12 bushels an acre. There are some sections where wheat yields 25 or 30 bushels to an acre, so there are some sections where cotton yields an average of a bale to an acre, but this comparison is simply based on the general average of the country.

In this fact, that an acre of coal yields 5,000 tons of freight, while an acre of agricultural land would take some 15,000 or 20,000 years to yield the same amount, is found the reason for the tremendous struggle going on not only in West Virginia, Kentucky and Alabama, but throughout the entire mineral regions of the country in which the railroad builders are seeking to secure dominating positions in the mineral districts.

It is only necessary, to take a statistical view of the growth of the tonnage in this country to show its importance, as in the following table of bituminous coal production:

	1869.	1879.	1904.
Total for the U. S., net tons. . . .	16,206,415	42,713,506	279,153,718

This year is fully 4 per cent. better than 1904, owing to the impetus to the steel and iron industries in the past few months, which call for an immense quantity to be turned into coke for this particular use.

The record of the anthracite companies is shown in the following schedule of only a few recent years. The production of anthracite has increased as follows:

1902	41,373,595 net tons.	1904	73,156,709 net tons.
1903	74,607,068 "	1905 (est.)	72,500,000 "

It is thus shown that the production for this year will be more than 31,000,000 tons in excess of that of the year of the strike—1902.

The question as to the resources of these anthracite companies is an interesting one, and many tables of longevity have been compiled. They are probably all faulty, for there is an undetermined factor always in judging of things unseen; that they may have a commercial utility longer than many of these estimates indicate,

is quite possible, following better and more economical use of the fuel. The day is fast approaching when every atom of the coal that is brought to the surface will be made use of; when the culm bank will be made to yield profit, to even greater extent than at present. With the large proportion of what are commercially the junior sizes, turned into even better prices than now obtains there will be more great profits for the anthracite coal land owners.

In 1895, William Griffith, a well accredited mining engineer, estimated the unmined coal tributary to the different companies to have been as follows:

Companies.	Unmined coal, tons.	Percentage.	Duration years.
Reading	2,143,706,500	42.25	216
New Jersey Central	877,569,700	17.30	163
Lehigh Valley	855,511,750	16.87	116
Lackawanna	332,332,000	6.55	54
Pennsylvania	316,502,750	6.24	63
Delaware & Hudson	115,823,200	2.29	26
Erie & Wyoming Valley	94,876,600	1.82	54
Delaware, Susquehanna & Schuylkill	69,901,200	1.38	35
Erie	38,879,400	.77	21
New York, Susquehanna & Western	26,890,500	.54	18
*Ontario & Western	13,971,100	.28	9

*The Ontario & Western has since made important investments in coal.

The duration of the supply is based on the shipments of coal in 1895, when it was 46,511,000 tons. Later figures would increase the holdings of the larger concerns to a slight degree, even with the increasing shipments.

In no portion of the country has there been so great a development of mineral resources as in those states below the old Mason and Dixon's line. In 1869 the production of bituminous coal was of no great moment, but the following table of its production since then, in net tons, shows how it has grown:

	1869.	1879.	1904.
United States	16,206,415	42,713,506	279,153,718
South	2,785,505	6,093,693	71,554,229

Where would the Norfolk & Western and the Chesapeake & Ohio be but for the coal traffic? Even the Baltimore & Ohio is doing much more than its late President, John W. Garrett, even dreamt of; he had the Maryland tonnage practically controlled with a little in southern Pennsylvania and in northern West Virginia. The Fairmont and Monongahela districts were not heard much of in his day. The tonnage of the two great lines in West Virginia shows that the Norfolk & Western carries a million tons a month and the Chesapeake & Ohio 700,000 tons, while the Baltimore & Ohio, on all its lines, carries nearly two million tons a month.

Comparing with the great annual tonnage of all kinds of freight hauled by the Pennsylvania Railroad, it is interesting to see that the growth of the coal output in Pennsylvania in ten years is more than equal to the present yearly traffic of the Pennsylvania Railroad. It is no wonder that we get tales of woe from the shippers about poor car service; the demand for fuel is so great and grows at such a pace that it is difficult to keep the motive and transportation facilities up to the mark. The Pennsylvania Railroad, in all kinds of coal and coke, handles 45,000,000 tons a year.

Whether there is really a scarcity of cars now, or whether short transportation facilities are only apparent because of the great demand from all branches of the industrial world, the fact remains that coal producers are not able to secure as many cars as they need, and yet not damage the business so far as price is concerned. Every fall brings with it this condition and perhaps always will, but it is worse now than ever before. There is no prospect that it will not be worse next fall than now. Railroad companies are purchasing an enormous amount of equipment, but it must be remembered that all lines of business are increasing in volume and that the railroads are covering more territory each year. Another thing; a large proportion of this equipment goes to take the place of that which is worn out and goes to the scrap pile. The enforcement of the safety-coupler law has driven many cars off the roads. It led to the rule of the Pennsylvania that when the repairs on a car would amount to \$250 that car should be sent to the scrap pile, as it would not pay to repair and put on the safety couplers. Again it has had the effect of limiting the orders for new cars by the small roads, and as the smaller roads find it cheaper, or easier, to hold the cars of other roads, at 20 cents a day penalty, than to buy cars of their own, the big roads are short of their own cars.

Any estimate of the value of anthracite coal territory based on a cash valuation of the coal in the ground is apt to be fallacious. The coal must be mined and marketed covering a period of many years during which values would be subject to all the commercial contingencies of any industrial or producing corporation. An estimate predicated on the cash value of coal in the ground when Mr. Gowen bought the Reading coal lands more than 30 years ago might have made the Reading Co.'s stock worth more than a thousand dollars per share.

If one should draw on the map a line from Baltimore to the head of the Cumberland Valley (Harrisburg), from thence to Hornellsville in New York, and thence to Buffalo or Dunkirk on Lake Erie, the region included between that line and the seacoast would form the district in which anthracite coal may be considered

a necessity of life. More than 90 per cent. of the anthracite mined is consumed in that section of the country; less than 10 per cent. goes west or south of the line above given, and the greater part of that small proportion follows the line of the lakes and is consumed in the larger cities and towns, either directly on the lake or within a short distance of some port. Everywhere else bituminous coal is supreme. Even in the district so delineated it is only as domestic fuel that anthracite has an exclusive hold.

The history of the anthracite trade since the strike of 1902 has been a record of extraordinary progress. Production has increased, prices have advanced, profits have become larger, and from a condition of semi-demoralization the trade has been brought to a state of high prosperity, the coal roads making large earnings, and their securities selling higher in the markets. The shipments of each company for 10 months, this year, and their percentage to the total are as follows:

	Tons, 1905.	Per cent.	Tons, 1904.	Per cent.
Philadelphia & Reading	10,408,312	20.57	9,328,635	19.72
Lehigh valley	8,299,353	16.41	7,840,646	16.57
Central R. R. of N. J.	6,579,344	13.00	5,989,910	12.66
Del., Lack. & Western R.R.	7,706,734	15.23	7,671,039	16.22
Delaware & Hudson	4,727,674	9.35	4,363,538	9.22
Pennsylvania R. R.	4,922,458	9.95	3,939,813	8.35
Erie R. R.	5,160,687	10.29	4,721,084	9.98
Ontario & Western	2,358,837	4.66	2,171,041	4.59
Delaware, Susq. & Schuylkill ..	1,330,105	2.63	1,279,604	2.71
Total	50,593,504	100.00	47,305,310	100.00

Operators declare that as a result of the settlement of the strike of 1902 the wages of miners have increased 26 per cent. for contract miners and 16 per cent. for company men. The average price of anthracite, according to the American Iron and Steel Association, has advanced from \$3.47 a ton in 1900 and \$3.80 in 1901 to \$4.50. For the retail consumers the advance in price has been even greater. With the increased tonnage and the higher prices there has been a great growth in the earnings of the coal roads. Reading, which in 1902 earned \$28,620,371, and in 1903 \$31,708,524, has this year earned \$36,852,007. The Lehigh Valley has increased its gross earnings from \$23,919,968 in 1902 to \$31,275,842 in 1905. These figures are for fiscal years. The Delaware & Hudson in the calendar year 1903 had gross earnings of \$29,500,794, and in 1904 they increased to \$34,655,133, and the Lackawanna road increased from \$21,398,761 to \$28,791,991.

The President on Rate Regulation.

The following is a condensed abstract of that portion of the President's message which treats of railroad rate regulation:

I am well aware of the difficulties of the legislation that I am suggesting, and of the need of temperate and cautious action in securing it. I should emphatically protest against improperly radical or hasty action. The first thing to do is to deal with the great corporations engaged in the business of interstate transportation. As I said in my message of December 6 last, the immediate and most pressing need, so far as legislation is concerned, is the enactment into law of some scheme to secure to the agents of the Government such supervision and regulation of the rates charged by the railroads of the country engaged in interstate traffic as shall summarily and effectively prevent the imposition of unjust or unreasonable rates. It must include putting a complete stop to rebates in every shape and form.

This power to regulate rates, like all similar powers over the business world, should be exercised with moderation, caution and self-restraint; but it should exist, so that it can be effectively exercised when the need arises.

The first consideration to be kept in mind is that the power should be affirmative and should be given to some administrative body created by the Congress. If given to the present Interstate Commerce Commission or to a reorganized Interstate Commerce Commission, such commission should be made unequivocally administrative.

In my judgment the most important provision which such law should contain is that conferring upon some competent administrative body the power to decide upon the case being brought before it whether a given rate prescribed by a railroad is reasonable and just, and if it is found to be unreasonable and unjust, then, after full investigation of the complaint, to prescribe the limit of rate beyond which it shall not be lawful to go—the maximum reasonable rate, as it is commonly called—this decision to go into effect within a reasonable time and to obtain from thence onward, subject to review by the courts. It sometimes happens at present not that a rate is too high, but that a favored shipper is given too low a rate. In such case the commission would have the right to fix this already established minimum rate as the maximum; and it would need only one or two such decisions by the commission to cure railroad companies of the practice of giving improper minimum rates.

I call your attention to the fact that my proposal is not to give the commission power to initiate or originate rates generally, but to regulate a rate already fixed or originated by the roads upon

complaint and after investigation. A heavy penalty should be exacted from any corporation which fails to respect an order of the commission. I regard this power to establish a maximum rate as being essential to any scheme of real reform in the matter of railroad regulation. The first necessity is to secure it, and unless it is granted to the commission there is little use in touching the subject at all.

Illegal transactions often occur under the forms of law. It has often occurred that a shipper has been told by a traffic officer to buy a large quantity of some commodity, and then after it has been bought an open reduction is made in the rate to take effect immediately, the arrangement resulting to the profit of the one shipper and the one railroad and to the damage of all their competitors, for it must not be forgotten that the big shippers are at least as much to blame as any railroad in the matter of rebates. The law should make it clear so that nobody can fail to understand that any kind of commission paid on freight shipments, whether in this form or in the form of fictitious damages, or of a concession, a free pass, reduced passenger rate or payment of brokerage, is illegal. It is worth while considering whether it would not be wise to confer on the Government the right of civil action against the beneficiary of a rebate for at least twice the value of the rebate; this would help stop what is really blackmail. Elevator allowances should be stopped, for they have now grown to such an extent that they are demoralizing and are used as rebates.

The best possible regulation of rates would, of course, be that regulation secured by an honest agreement among the railroads themselves to carry out the law. Such a general agreement would, for instance, at once put a stop to the efforts of any one big shipper or big railroad to discriminate against or secure advantages over some rival; and such agreement would make the railroads themselves agents for enforcing the law. The power vested in the Government to put a stop to agreements to the detriment of the public should, in my judgment, be accompanied by power to permit, under specified conditions and careful supervision, agreements clearly in the interest of the public. But, in my judgment, the necessity for giving this further power is by no means as great as the necessity for giving the commission or administrative body the other powers I have enumerated above; and it may well be inadvisable to attempt to vest this particular power in the commission or other administrative body until it already possesses and is exercising what I regard as by far the most important of all the powers I recommend—as indeed the vitally important power—that to fix a given maximum rate, which rate, after the lapse of a reasonable time, goes into full effect, subject to review by the courts.

All private car lines, industrial roads, refrigerator charges and the like should be expressly put under the supervision of the Interstate Commerce Commission or some similar body so far as rates and agreements practically affecting rates are concerned. The private car owners and the owners of industrial railroads are entitled to a fair and reasonable compensation on their investment, but neither private cars nor industrial railroads nor spur tracks should be utilized as devices for securing preferential rates. A rebate in icing charges or in mileage or in a division of the rate for refrigerating charges is just as pernicious as a rebate in any other way. No lower rate should apply on goods imported from the American seaboard to destination except in cases where water competition is the controlling influence.

There should be publicity of the accounts of common carriers; no common carrier engaged in interstate business should keep any books or memoranda other than those reported pursuant to law or regulation, and these books or memoranda should be open to the inspection of the Government. Only in this way can violations or evasions of the law be surely detected. A system of examination of railroad accounts should be provided similar to that now conducted into the national banks by the bank examiners; a few first-class railroad accountants, if they had proper direction and proper authority to inspect books and papers, could accomplish much in preventing willful violations of the law. It would not be necessary for them to examine into the accounts of any railroad unless for good reasons they were directed to do so by the Interstate Commerce Commission.

It is greatly to be desired that some way might be found by which an agreement as to transportation within a State intended to operate as a fraud upon the Federal interstate commerce laws could be brought under the jurisdiction of the Federal authorities. At present it occurs that large shipments of interstate traffic are controlled by concessions on purely State business, which, of course, amounts to an evasion of the law. The commission should have power to enforce fair treatment by the great trunk lines of lateral and branch lines.

This legislation should be enacted in a spirit as remote as possible from hysteria and rancor.

The big railroad men and big shippers are simply Americans of the ordinary type who have developed to an extraordinary degree certain great business qualities. They are neither better nor worse than their fellow-citizens of smaller means. They are merely more

able in certain lines and therefore exposed to certain peculiarly strong temptations.

It is because, in my judgment, public ownership of railroads is highly undesirable and would probably in this country entail far-reaching disaster that I wish to see such supervision and regulation of them in the interest of the public as will make it evident that there is no need for public ownership. The opponents of Government regulation dwell upon the difficulties to be encountered and the intricate and involved nature of the problem. Their contention is true. It is a complicated and delicate problem, and all kinds of difficulties are sure to arise in connection with any plan of solution, while no plan will bring all the benefits hoped for by its more optimistic adherents. Moreover, under any healthy plan the benefits will develop gradually and not rapidly.

Finally we must clearly understand that the public servants who are to do this peculiarly responsible and delicate work must

have done as they best could under such conditions accomplishes little. What we need to do is to develop an orderly system, and such a system can only come through the gradually increased exercise of the right of efficient Government control.

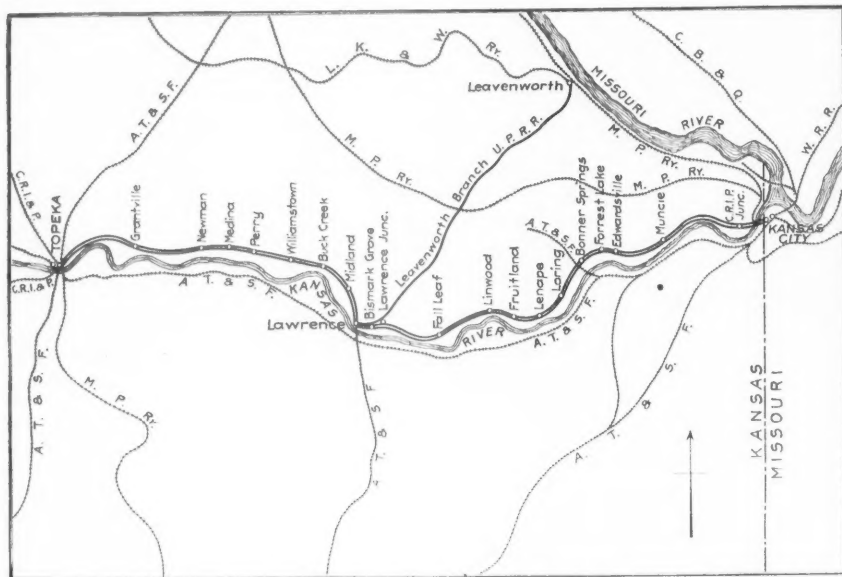
Kansas City-Topeka Double Track Work of the Union Pacific.

The portion of the Kansas division of the Union Pacific between Kansas City and Topeka is used jointly by the owners and the Rock Island. Although the latter uses it merely as a means of getting into Kansas City, doing no local business of any character between the terminal points, the traffic in recent years has overtaxed considerably the capacity of the single-track line, making a second track a necessity. The line follows the narrow valley of the Kansas river—more generally known, perhaps, as the Kaw—

being on the north side of the river, as will be seen by referring to the accompanying map. On each side of the valley, for a considerable part of the distance, the country is high and rugged. At many points it rises abruptly from the river's edge, leaving little room for a railroad, and making necessary heavy rock cutting to get a footing on the hill sides. Therefore, the parallel lines of the Union Pacific and Santa Fe on opposite sides of the river fully occupy the only practicable approach to Kansas City from Topeka. The river itself has all of the characteristics of the streams of this region, being uncertain and shifty and changing channel frequently.

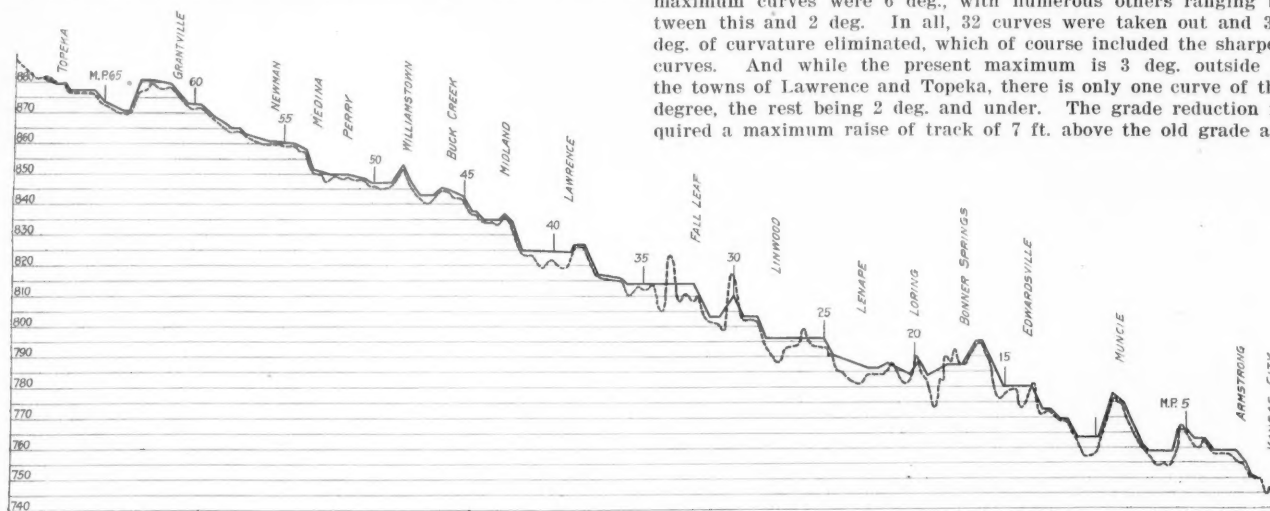
This line of the Union Pacific was built in the '60's. Naturally it was located to make construction work and cost as light as practicable, and contained many heavy grades and bad curves, and although there have been some improvements of these features from time to time, the general characteristics of the line have remained much the same as originally built. The present work, therefore, in addition to double tracking, has amounted practically to rebuilding the line by converting it into one having easy grades and light curves. It also involved raising the grade wherever necessary to bring it above all high water except that of the great flood of 1903.

A condensed profile is given herewith which shows the old and the revised grade lines. The previous ruling grades were 1 per cent. This maximum has been reduced to .35 per cent. The average adverse gradient is only .25 per cent., however, there being a total of only about two miles of the maximum. The former maximum curves were 6 deg., with numerous others ranging between this and 2 deg. In all, 32 curves were taken out and 355 deg. of curvature eliminated, which of course included the sharpest curves. And while the present maximum is 3 deg. outside of the towns of Lawrence and Topeka, there is only one curve of this degree, the rest being 2 deg. and under. The grade reduction required a maximum raise of track of 7 ft. above the old grade and



Map of Union Pacific Double Track Between Kansas City and Topeka.

themselves be of the highest type. But while I fully admit the difficulties in the way, I do not for a moment admit that these difficulties warrant us in stopping in our effort to secure a wise and just system. They should have no other effect than to spur us on to the exercise of the resolution, the even-handed justice and the fertility of resource which we like to think of as typically American, and which will in the end achieve good results in this



Profile of Old and New Double Track, Kansas City to Topeka, U. P. R. R.

Broken line shows former grade, and solid line revised grade.

as in other fields of activity. The task is a great one and underlies the task of dealing with the whole industrial problem.

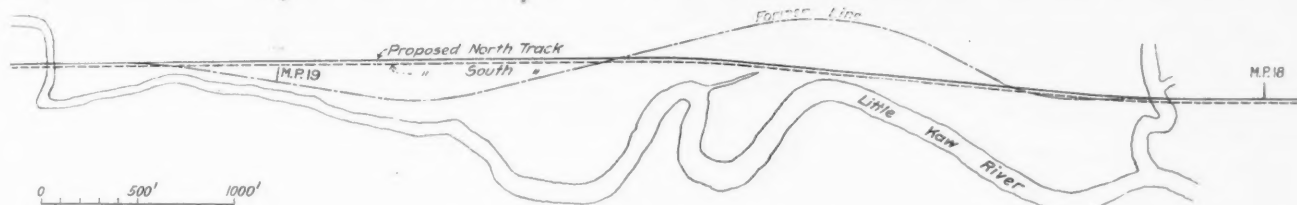
But the fact that it is a great problem does not warrant us in shrinking from the attempt to solve it. At present we face such utter lack of supervision, such freedom from the restraints of law, that excellent men have often been literally forced into doing what they deplored because otherwise they were left at the mercy of unscrupulous competitors. To rail at and assail the men who

a maximum drop of about 10 ft. The minimum raise was 9 in. for rock ballasting. The basing point for the revised grade line was the 1904 high water level, the minimum distance maintained above that line being 2 ft. to top of rail.

The line changes required considerable new location work, incidentally effecting a saving of 1,000 ft. in total distance. A typical example is found in the change west of Bonner Springs, shown herewith, where a heavy reverse curve was replaced with almost

a tangent. These changes made new right-of-way necessary, but little had to be bought, as the road owns a 400-ft. right-of-way for 26 miles west of Muncie, which is part of the original land grant of the Government to the Kansas Pacific Railway Company. The road has only occupied such portion of this width as was needed, much of the remainder being made use of by the farmers owning the adjacent land. In the present changes, where it was necessary to take possession of strips that had been appropriated thus, any improvements on them of value were paid for at a fair price.

necessary in the old track. As soon as sections of the second track could be placed in suitable condition for service they have been used as passing tracks, thus affording continuously increasing relief to the congestion of traffic. The new track is laid throughout with 80-lb. rails, "Continuous" rail joints and "Burnettized" Texas pine ties. Each tie is marked with a date nail and is tie-plated. The tie plates are much larger than any previously used by the Union Pacific, weighing about 6½ lbs. apiece, and having flat bottoms. All curves 2 deg. and over are spirited and super-elevation



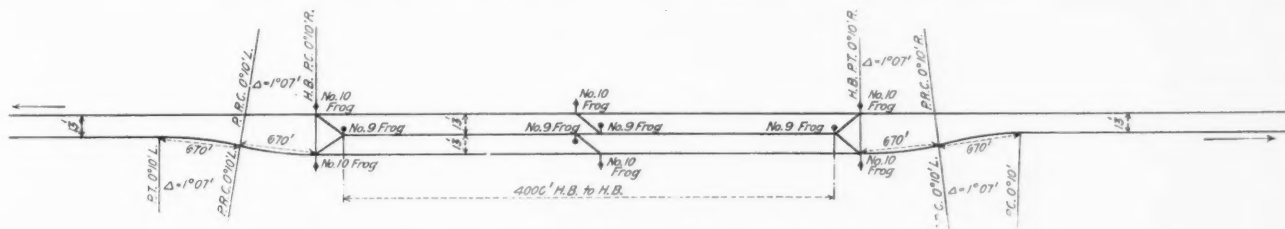
Change of Line West of Bonner Springs.

In connection with these line changes a map is shown of the Lawrence situation, from which it will be seen that the line makes something more than a right-angle to get into the town, the north side of which is situated in a sharp bend in the river. It is probable that some time in the near future a cut-off will be built as shown by the map, which will complete and form the base of the triangle, two sides of which already exist. This cut-off will be 4.1 miles long, and will save about 2½ miles in distance. It will be used by all Rock Island trains and all through freight trains of the Union Pacific.

The present second track work begins a short distance east

put in according to Union Pacific tables. The line is being rock ballasted, with a minimum depth under the ties of 9 in. This ballast is obtained from a quarry just west of Loring, where the railroad company has a 1,200-yd. crusher. A gravity track, having capacity for 25 cars, enables the cars to be dropped down to the crusher for filling, and then continued on down, across a scale, to the standing track from which they are taken out.

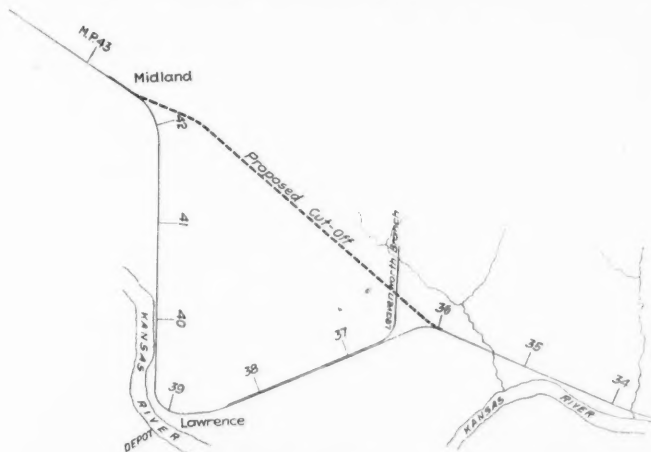
There are 18 stations on the line between Armstrong and Topeka. All are quite small, however, except Lawrence, which is a little more than half way. Complete changes have been made in the facilities at all of these small stations. Passing tracks were



Sketch of Standard Passing Track Arrangement on Union Pacific Double Track.

of the Rock Island junction in Armstrong yards and extends a little west of the Topeka passenger station; but when the work now under way is completed the double track will extend to Union Station, Kansas City, the plan including the remodeling of Armstrong yards, which will be done after the present work is completed. The double-track line will therefore be approximately 67 miles long. However, the ultimate purpose of a second track to

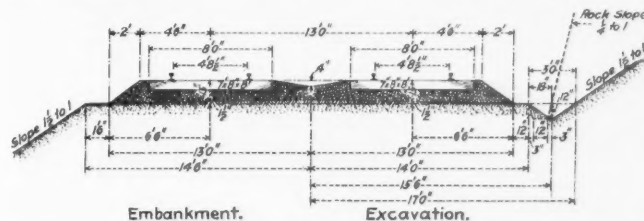
located about every 12 miles, bringing them at Muncie, Bonner Springs, Linwood, Perry and Grantville. Each station is given a business track 2,000 ft. long, and at Linwood a "potato" track 2,050 ft. long was put in, as large quantities of potatoes are raised in this region, making a special track for the potato cars desirable and necessary. New depots were built at Muncie, Fall Leaf, Buck Creek and Newman, and the Bonner Springs building was remodeled. These new stations are frame on a concrete foundation, and contain a waiting room, ticket office, freight room with a space partitioned off for express, and living rooms for the agent. The platforms are 700 ft. long. They are earth covered with Sher-



Proposed Cut-off Near Lawrence.

Denver is kept in mind in all new work that is done west of Topeka, which is laid out for double tracking.

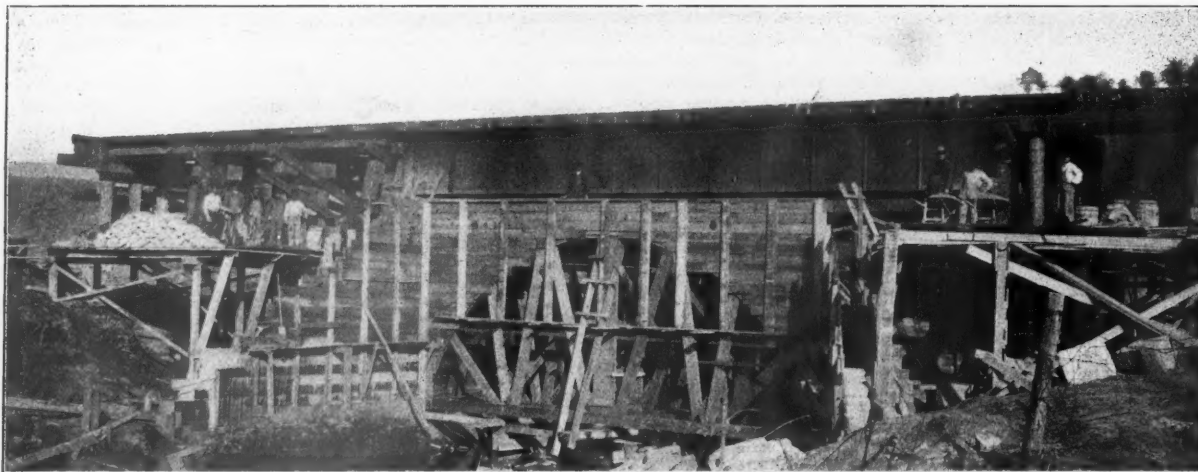
In the execution of the second track work a traffic averaging 60 trains a day had to be taken care of, adding much to the difficulty. In general, the plan followed—except, of course, in entire new location—was to use the old line as a working track for the new second track and then reverse the relation when changes were



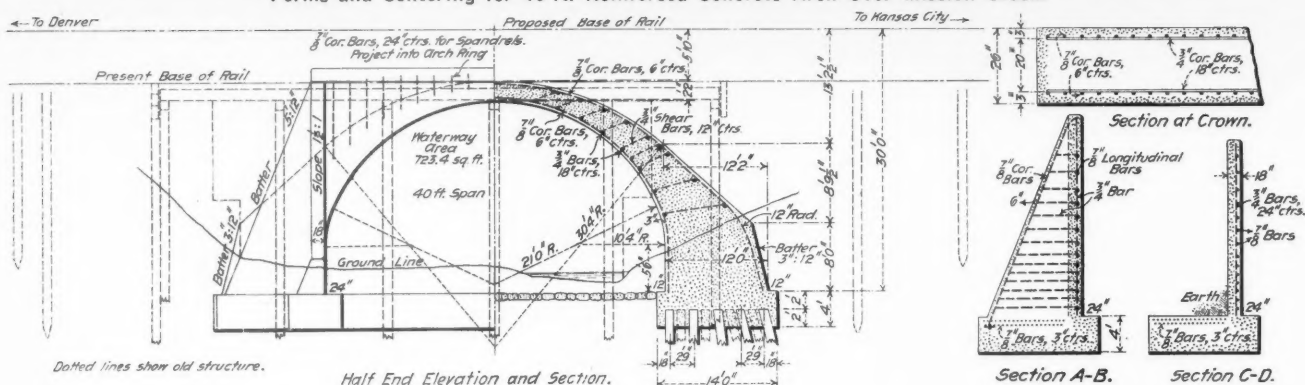
Harriman Lines Common Standard for Double-Track Roadbed With Broken Stone Ballast.

man gravel, which is disintegrated granite obtained by the Union Pacific in Wyoming. The Bonner Springs station was built with two waiting rooms, and its freight room was extended. At all other small points the station was moved or some change made. All of these small stations likewise have stock pens for loading cattle except Muncie, which is too close to Kansas City to need one. The rearrangement required these pens to be moved in all cases and new pens and chutes, much more substantial than the old, were built to replace them.

A sketch of the standard passing track arrangement adopted for this work is shown, from which it will be seen that the passing track is placed between the main tracks. The track adjacent to the station—the north track in the sketch—is left straight



Forms and Centering for 40-ft. Reinforced Concrete Arch Over Mission Creek.

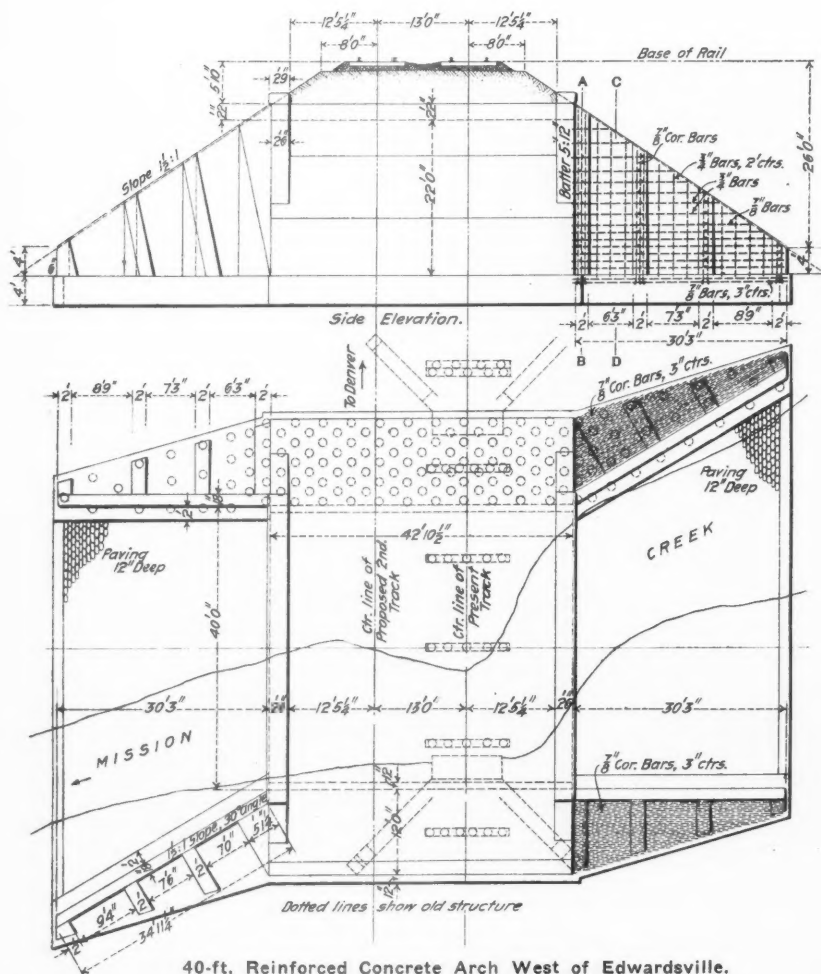


Dotted lines show old structure.

Half End Elevation and Section.

Section A-B.

Section C-D.



40-ft. Reinforced Concrete Arch West of Edwardsville.

to give the operator a clear view, and a 13-ft. offset is given to the south track. The approach curves to the latter are only 10 min., permitting a train to go through at full speed. These passing tracks are 4,000 ft. long in the clear, and crossovers from the main tracks are placed midway. The flexibility of operation which this plan permits is readily apparent.

The proximity of track and river at several points along the line has already been alluded to. A typical case occurs north of Lawrence, best seen in the map showing the proposed Lawrence cut-off. So much trouble was experienced holding the river in its channel at this point, where it was endangering the roadbed by cutting away the left, or east, bank, that two winters ago the railroad company built four stone and three pile dikes about 60 ft. long out into the river, which checked effectively the encroachment. The railroad company also built one 150-ft. and two 50-ft. dikes for the county further north. Seven new dikes will be built between Armstrong and Lawrence—one east of Muncie, one between Loring and Lenape, three just east of Linwood, and two a short distance east of Lawrence. Two of those east of Linwood will be 100 ft. long, starting from the shoulder of sub-grade, and the remainder 60 ft. Forty-six-foot piling will be used with a stone and brush filling.

There are a large number of bridges on the work, embracing a variety of types. Illustrations of typical structures are shown, including a view of the Kaw river bridge at Kansas City. This bridge, which was completed in the spring of 1904, is 552 ft. long, being composed of three double-track through pin-connected spans 180 ft. 2 1/2 in. long c. to c. of end pins. After the destruction of the old bridge a temporary double-track pile bridge was put in to carry traffic, which served as falsework in the erection of the new. The old substructure was used, the

only change being to cut down the tops of piers and abutments to provide for the lower bridge seats of the heavier structure. The bridge was erected in three months in the face of a heavy traffic, including, besides the regular train movements of the Union Pacific and Rock Island to and from Union Station, all stock yards and commercial switching of the Union Pacific. While a traveler was used some in erection, most of the work was done by a derrick car.

The next largest bridges on the line are the through riveted truss spans over Stranger and Delaware rivers, the former being just east of Linwood and the latter just west of Perry. One of these spans is 137 ft. 9½ in. c. to c. of end pins. It is a Pratt truss with subdivided panels. These bridges, which replace old single-track through lattice girder designs, were erected on falsework by the derrick car. The old bridges rested on dimension stone abutments, which were extended with concrete for the new double-track structures. The grade at Stranger river was raised 4 ft. A 110-ft. span of the same design as the foregoing was placed at Big Muddy creek just east of Grantville, and a 125-ft. span at Soldier creek just east of Topeka.

Between Muncie and Edwardsville, where there is a change of line on a new location, there is a 96-ft. pony truss, latticed span over Turkey creek, drawings and a photograph of which are reproduced. Just west of Bonner Springs is Wolf creek, which for-



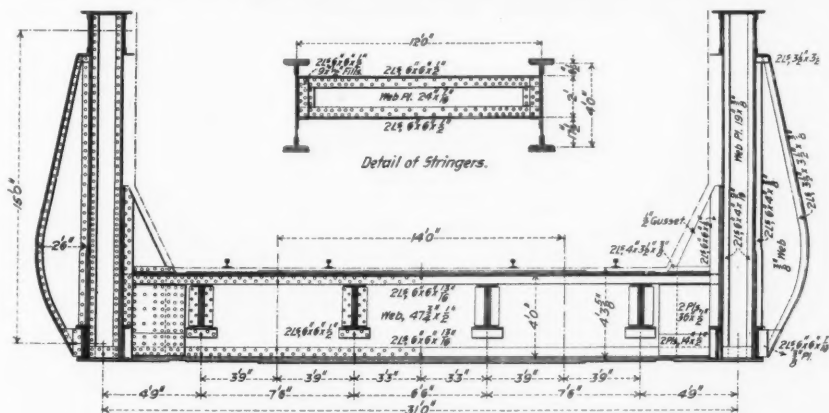
96-ft. Pony Truss Over Turkey Creek.

There are a considerable number of concrete structures, the largest being a 40-ft. reinforced concrete arch over Mission creek, west of Edwardsville, replacing a wooden trestle. It is a three-centered arch 22 ft. high at the center and 26 in. thick at the crown. Johnson corrugated steel bars, ¾ in. and ¼ in., arranged as shown by the drawings, are used for reinforcement. The concrete mixture is 1:2½:5. In building, the foundations and abutments were completed, after which a light single-track girder span was put in to carry traffic while one-half of the arch ring was completed. The track was then shifted to that side and the remaining half finished. The grade was raised about 6 ft. at this point.

The ballasted floor spans were built of concrete and I-beams, a typical example being shown in Bridge 42 at Edwardsville, except that it is a double-span bridge and has a hand railing. The floor beams are 12-in., 55-lb. I-beams, 19 ft. long, the tension side of the slabs also having 1-in. corrugated bars between the I-beams. The slab is 1:2½:5 concrete, and the abutments and pier 1:3:6.

Drawings of two designs of 15-ft. and a 6-ft. plain concrete arch are shown. All pipe culverts were built with concrete end and wing walls.

As already mentioned, the steel bridges were erected with a derrick car. This car did the unloading and erection work on three bridges, including the through riveted truss spans over Stranger and Delaware rivers, in a month, or an average of nine



Detail of 96-Ft. Pony Truss Over Turkey Creek.

merly was crossed by a 125-ft. single-track through latticed truss skew span. This was replaced by two deck plate girder double-track spans, 60 ft. and 65 ft. long respectively, skewed at the center and square at the ends. The pier at the center and the extensions to the dimension stone abutments are plain concrete.



138-ft. Riveted Through Truss.



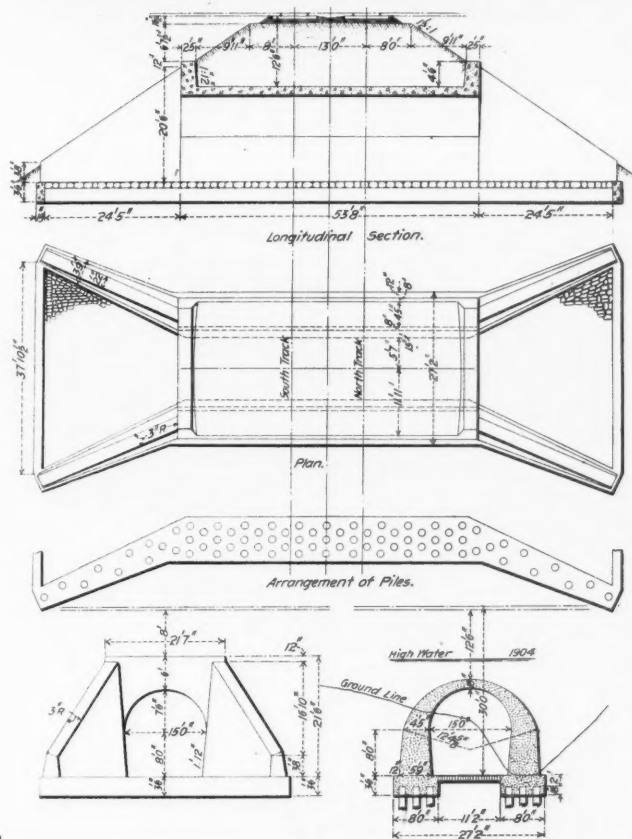
Kaw River Bridge at Kansas City.

squares. The grading was done by contract, all other work being done by company forces. The total cost of the work will be about \$2,250,000. It is expected that the entire second track will be ready for service by the end of the year.

The work was planned and the most of it executed under the supervision of Mr. J. B. Berry, Chief Engineer of the Union Pacific until Nov. 10, when he became Chief Engineer of the Rock Island. Mr. Russell L. Huntley, who was actively identified with the work as Principal Assistant Engineer, is now in charge, having succeeded Mr. Berry as Chief Engineer. Mr. J. C. Beye, Resident Engineer, Kansas City, is in immediate charge of the work. The through riveted truss span and pony latticed truss span bridges, also the Kaw river bridge at Kansas City, were designed by Mr. James Keyes,



Bridge No. 42 Near Edwardsville.



15-ft. Concrete Arch at Edwardsville.

Engineer of Bridges. The remaining steel bridges are Harriman Lines' common standard. Mr. Walter Dennis, Chief Draftsman in the Resident Engineer's office, designed the concrete structures under the latter's supervision. Mr. A. G. Shaver, Signal Engineer, will have charge of the installation of the signaling and interlocking apparatus. The contract for the grading was let to W. C. Bradbury, Denver, Colo. We are indebted to Mr. Berry and Mr. Beye for the data for this article.

The Austrian manufacturers of rolling stock have made an arrangement with the State Railroads which will enable them to exhibit cars and locomotives at the Milan exhibition next spring. The state will order them and pay for them when the show is over.

The Baker Bridge Collision.

The collision which occurred at Baker Bridge on the Fitchburg Division of the Boston & Maine, 18 miles from Boston, Sunday night, Nov. 26, was one of the most appalling that has happened in New England in this generation. It took place about 8.13 p.m., when the westbound Montreal express, consisting of nine cars—mail and baggage coaches and sleepers—drawn by two heavy engines, running at a speed of 35 to 40 miles an hour, crashed into the rear of the Marlboro local, consisting of an engine and two cars of passengers. The momentum of the express train was so great that the forward engine plowed its way entirely through the rear car, and half way through the next car of the local before coming to a stop. The rear car was fairly well filled with passengers, many of whom were killed outright, or severely injured. Coals from the forward engine were scattered about, and almost immediately set fire to the wreck with the result that some who were left alive in the rear car but were pinned down by timbers were burned to death. Sixteen were killed on the spot, or died on the way to the hospital, and one of those removed has since died; more than 30 others were injured, of whom six are still on the danger list.

The scene of the disaster was at a flag station about 1½ miles west of Lincoln. The track here is straight, and the roadbed is in a cut. The local had just started from Baker Bridge, and was slowly moving. The interval of 30 minutes between the two trains on starting from Boston had been gradually diminished until it was not more than five minutes at Lincoln, and probably much less. That the rear brakeman faithfully carried out the fusee rule is shown by the fact that three 10-minute fusees, still burning, were passed by the express. The first of these was nearly three miles from the scene of the collision, and another about 1½ miles away, while the third had just been thrown off. There are no block signals. Mr. Tuttle's use in his newspaper statement of the term "spacing block-signals," was incorrect, as the signals which he spoke of are designed only to maintain a space of time between trains at a given place.

At each place where a man is permanently stationed (as at some telegraph offices, highway crossings, etc.) a green flag by day and a green light (by night) is required to be displayed for five minutes after the passage of every passenger train, and for 10 minutes after every freight train. Two such lights (and probably three) were in position at the time the Montreal express passed, the first of which was about 9,500 ft. east of Baker Bridge, and the second about 5,800 ft. away.

The engineer of the leading engine of the express, Horace Lyons, was but little injured in the collision, but was badly shaken up, and was found afterwards about the scene of the accident, on the verge of mental collapse, and unable to account clearly for his escape. The fireman was instantly killed, and the railroad officers think the engineer must have jumped from his engine, or he would have met a similar fate. He acknowledged to Superintendent Cheever, of the Fitchburg Division, and his assistant, Mr. Smith, that he saw the three red and two green signals set against him, but says he does not know why he did not stop for them; he was expecting, he says, to see the red tail-lights of the local train, which he knew was but a short distance ahead. He disappeared for a time and the efforts of the Superintendent and of the state police to locate him were for two days unsuccessful. It is known that he was much affected by the results of his carelessness, and it was feared he had left the state, or that his mind had become disordered, but on Tuesday evening a message was sent to Master Mechanic Todd saying that Lyons was at a certain house in Chelsea. The foreman went to the spot indicated by the message and found Lyons there. He talked freely, and said he was willing and anxious to testify at the inquest the next day at Concord, and he did so. At the conclusion of the testimony (which was not made public) Lyons was placed under arrest, charged with manslaughter. His bail was fixed at \$10,000, in default of which he was taken to jail.

It is reported that Engineer Wade of the second engine of the express noticed the high speed of the train when the green warning signal at Lincoln station was passed, and remarked to the fireman that if they were going by the signals like that they would have to "drag him along," and he closed the throttle of his engine.

Engineer Lyons entered the service of the Boston & Maine in 1899 as a fireman, previous to which he had been a conductor on the West End Street Railway (Boston) for about eight years. His service was satisfactory, and he had the confidence and respect of his superiors. The Locomotive Superintendent and Division Superintendent both speak highly of him, and they regarded him as exceptionally capable and reliable. His record has been clean, and when examined for promotion last July passed creditably and was given an engine, but had not yet been assigned to a regular run. His habits were good, and he did not use intoxicants.

It is the rule and practice of the Boston & Maine to train a fireman on one division only, and when promoted to be an engine-man the fireman is given a position on the division where he has

received his training, and that rule was followed in this case. Lyons was therefore thoroughly familiar with the locality, and he had been for several months running as an engineer on that division, much of the time on fast trains.

A Boston newspaper printed a statement which was attributed to Lyons' friends, saying that he had been overworked; that for many weeks he had been called out for extra duty nearly every night, and was therefore much exhausted. This statement was pronounced by President Tuttle to be absolutely without foundation; the division officers, he says, are careful to protect their engineers and firemen from overwork; and they find much more difficulty in preventing it than would be experienced in providing for extra runs, as the men are usually very glad to increase their wages in this way. The road has men enough, and it is not necessary for engineers to work without proper and sufficient intervals of rest. Lyons had done no work that day before taking out the express. When asked by Superintendent Cheever if he was asleep when the collision occurred, Lyons said: "Asleep! No; I had just started out."

This failure to do at that moment a duty which was quite plain and simple, and with which he was thoroughly familiar, and was in the habit of doing many times every day, is a mystery on which as yet no light has been thrown. It is not explained by the theory that the engineer was reckless and was deliberately taking chances; that might conceivably be true in cases where there was no special risk to run, but in that of an engineer who is perfectly aware that in case of a collision with a train ahead he will be the first to suffer, he will not voluntarily run the risk of death by the neglect to hold his train in check when he knows he is closing up the gap between himself and the preceding train.

Air Power In the Union Pacific Shops at Omaha, Nebraska.

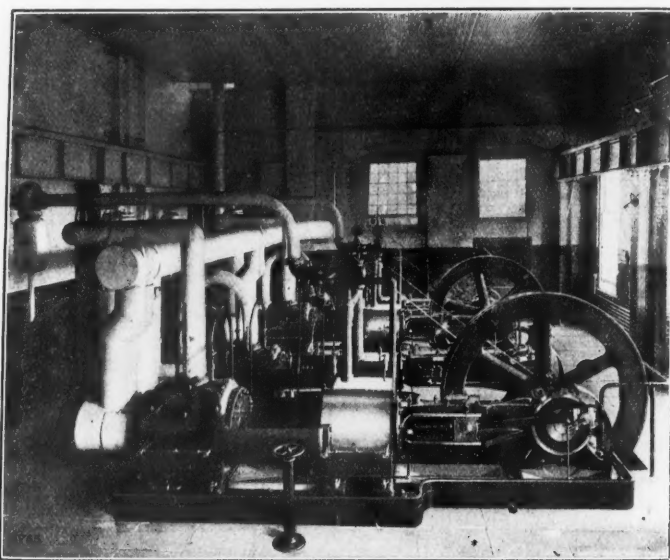
In the shops of the Union Pacific Railway at Omaha, Neb., air power has been carried to a degree of application probably equaled in no other shop in the country; and the extent of its use has made necessary an air compressor installation ranking among the largest for this purpose. The buildings comprising the various departments of these shops are compactly grouped beside the yards of the company and the power house is at the south of the main group, and was one of the shop buildings under the scheme in effect before the late improvements and rearrangement. This fact accounts for some features of power house arrangement which differ from usual practise where the building is designed to suit the work. A longitudinal fire-wall separates the engine and boiler rooms. The boiler equipment was selected to meet the conditions of very limited space, and for this reason it is made up of six marine shell boilers, with internal fireboxes. These units are rated at 250 h.p. each, giving a total capacity to the plant of 1,500 boiler horse power. The boilers are fired by hand, the coal being dumped on the fire-floor from cars on a side track which parallels the power house.

The engine room contains two class "GC" Ingersoll-Sergeant air compressors made by the Ingersoll-Rand Company, New York. They are of the duplex pattern, with cross-compound steam and air cylinders. The steam cylinders are sheathed and insulated and are equipped with the Meyer balanced adjustable cut-off valves. A reheating steam receiver between high and low pressure cylinders draws live steam from a by-pass inside the throttle. The standard Sergeant "Air Ball" governor regulates the speed and pressure by throttling the steam supply. A by-pass pipe taken from the steam pipe inside the governor leads to the low pressure steam chest. It has a pressure reducing valve which ordinarily is closed. But when the governor throttles the steam supply and the pressure on the high pressure cylinder reaches a certain minimum, this valve opens, admitting live steam direct to the low pressure cylinder through the by-pass pipe, thus equalizing the work in the two steam cylinders. The main frames are of girder type and the main bearings are large and heavy. The cranks are of the balanced disk pattern and a solid sole-plate, with a rim for catching oil, supports the entire compressor on a solid concrete foundation. The high and low pressure air cylinders are water-jacketed on the heads and barrels, and both cylinders are fitted with the Sergeant piston inlet valve. The discharge valves are of the vertical direct-lift pattern, readily accessible. A somewhat novel style of air intake is used. The inlet tubes of the low pressure cylinders are surrounded by a sheet iron case, leading to a vertical riser of sheet steel pipe which connects with a main intake header carried to an opening outside of the engine room on the northeast corner. Traps in the intake casing give easy access to the piston tube and stuffing box. The intercooler of each unit is of the vertical receiver type, with tinned brass tubes for the cooling water and an ample air storage capacity. Proper provision is made for withdrawing condensed moisture and the entire intercooler and connecting air pipes are covered with insulating material. Each compressor has a free air capacity of 2,216 cu. ft. p. m., when running at 120 r. p. m. The air pressure is maintained at about 110 lbs. on the receiver,

giving an average working pressure of 100 lbs. throughout the shops. Air cylinders are 16¼ in. and 24¼ in. in diameter. The steam cylinders are 16 in. and 24 in. in diameter and the stroke is 18 in.

The primary receiver is mounted on the outside of the power house on the north side. Its dimensions are 6 ft. by 30 ft., giving an exceptionally large storage capacity. The main air pipe passes underground to the shop buildings and radiates to the several departments. All piping in the buildings—air, water and gas—is carried in shallow conduits in the floor with removable covers and branches with valves rise at each post for connection with the shop appliances.

The applications of air in the shops are those common to railway repair work. In the locomotive shop, air drills in various sizes are used for drilling, reaming and tapping; chipping and riveting hammers have their usual place, and pneumatic stay bolt cutters assist in dismantling fireboxes. A small rotary air motor drives gearing for turning locomotive drivers in setting valves. Another operates a cylinder boring machine. Air hoists and air jacks assist in the handling of heavy parts. A number of pneumatic presses are also used for various classes of work. In the air brake testing department, air pressure is drawn from the main plant. An interesting device here is a pneumatic pressure



Air Compressor Room at the Omaha Shops of the Union Pacific.

coupling which holds the valves under test against the supply pipe thus saving the time and trouble of screwing them in place.

In the yards, warehouse and foundry air hoists are used extensively. In the car shops pneumatic drills and air jacks are used and the cars are sand-papered, and paint is removed and applied, by air appliances. The majority of the cleaning is also done by the air blast system.

Washington Correspondence.

WASHINGTON, Dec. 5.—That part of President Roosevelt's message which deals with the subject of railroad legislation is rather more conservative than had been generally expected by Senators and Representatives. It shows that he has changed his position somewhat since he wrote his message of last year. He is now careful to make it plain that he would have the authority of the Commission to make rates limited to the fixing of maximum reasonable rates. A year ago he favored having a new rate made by the Commission go into effect "immediately," and remain in effect "unless and until it is reversed by the court of review." Now he recommends that it should go into effect "within a reasonable time" and "obtain from thence onward, subject to review by the courts." Under some interpretations placed upon this language it is held that a bill that would provide for a judicial review prior to the taking effect of an order of the Commission would not be in conflict with the President's recommendation.

The shifting of his position has not attracted so much attention or caused so much comment as those sentences in the message that indicate Mr. Roosevelt's growing appreciation of the difficulties involved in the problem of railroad regulation and his evident desire to impress upon Congress the necessity for cautious and conservative action. He says, for instance: "I am well aware of the difficulties of the legislation that I am suggesting, and of the need of temperate and cautious action in securing it. I should emphatic-

ally protest against improperly radical or hasty action." Evidently having in mind the way in which the House of Representatives was swept off its feet last year, when the Esch-Townsend bill was jammed through practically without consideration, and the criticism to which the Senate Committee was subjected for insisting upon knowing something about the subject before undertaking to act, he says: "This legislation should be enacted in a spirit as remote as possible from hysteria and rancor." These indications of a rather more conservative attitude on the part of the President and his evident willingness to concede something to the judgment of Congress have led to a generally more hopeful view as to the possibility of the administration and the leaders in the Senate and House getting together upon some reasonably conservative bill that will provide more efficient means for dealing with rebates and discriminations, especially when they are obtained through the medium of private car lines, private terminals, or other subterfuges, and that will provide for the correction of unreasonable or exorbitant rates without depriving the railroads of the right to a day in court.

Senator Elkins of West Virginia, Chairman of the Senate Committee on Interstate Commerce, to-day made the first movement looking to a compromise. He discussed the situation with leading Senators, and this evening gave out the following as a summary of what ought to be contained in a bill to confer upon the Interstate Commerce Commission authority to fix a reasonable rate and put it into effect promptly and, at the same time, give the railroads the protection of an adequate judicial review:

"Whenever any rate, fare, or charge fixed by any common carrier for any service shall be unreasonable or unjustly discriminatory or otherwise in violation of any provision of the act approved Feb. 14, 1887, entitled, 'An Act to Regulate Commerce,' or any act amendatory thereof, the Interstate Commerce Commission shall have power, after investigating the facts and hearing the parties affected, to make an order modifying such rate, fare, or charge so far as may be necessary in order to remove the unreasonableness, unjust discrimination, or other illegality thereof; and such order shall take effect at the expiration of such time as the Commission shall prescribe not less than (blank) days after the publication thereof.

"Any party affected by such order shall be entitled to institute a proceeding to review such order in the Circuit Court of the United States for any District through which the line of the carrier may run; and if the court in such proceedings shall find that the rate fixed by such carrier was not unreasonable, unjustly discriminatory, or otherwise unlawful it shall enter a decree setting aside such order; but if the court shall find that such order modified the rate, fare, or charge fixed by the carrier either more or less than was necessary in order to remove the unreasonableness, unjust discrimination, or other illegality of such rate, fare, or charge, then the court, by its decree, may modify or correct such order accordingly."

It is apparent that this proposition of Mr. Elkins raises some nice constitutional questions, and the advocates of a more radical plan are criticizing it to-night on the ground that it would be unconstitutional, as well as on the ground that it would not be effective, but would lead to prolonged litigation. Senator Dolliver, one of the leading advocates of more radical action, declared that the Elkins plan would not be a compromise, and that he would prefer the Foraker bill to it.

The message cuts the ground from under both the Interstate Commerce Commission bill and the revised Esch-Townsend bill, if the preliminary reports as to the nature of the latter bill are correct. It does this by proposing to limit the power of the Commission to the fixing of a maximum reasonable rate. The Commission bill proposes to authorize the making of both maximum rates and the fixing of differentials. It is understood that the revised Esch-Townsend bill contains practically the same provision. A considerable element among the advocates of governmental rate making will not be satisfied with anything that falls short of giving the Commission power to fix the relative adjustment of rates affecting rival localities either by the making of absolute rates or by the making of both maximum and minimum rates. On the other hand, there are members of both Houses of Congress who believe it would be both dangerous and unwise to give the Commission the vast power over the industries and commerce of the United States that it would possess if clothed with authority to fix differentials. It is feared that the Commission, whether making rates by rule or by favor, would so use this power as to build up some communities or sections of the country at the expense of other communities or sections. It is probable that the debates in Congress will develop a heated controversy between the advocates and the opponents of the proposition to give the Commission power over differentials.

One feature of the President's message, which he seems to have adopted from the annual report of Attorney-General Moody would indicate that some phases of the railroad problem have not been very profoundly studied by the administration. This is the recommendation, most clearly set forth by the Attorney-General, that, upon proof that one shipper has been given a preferential rate, the Commission shall prescribe that rate as the full maximum rate to be given all shippers in like situations. The President and the Attorney-General seem to think that this would solve the problem of suppressing rebates through the exercise of the rate-making power. They lose sight of the fact that there is no inducement for a road to grant preferential rates on other than competitive traffic,

and that, if the Interstate Commerce Commission should compel the road that had granted a preferential rate to one shipper to give the same rate to all shippers, all competing roads would either have to put in the same rate or cease competing for that class of traffic. It is apparent that this would punish the innocent roads for the act of the guilty. The proposition is not new. It has been before the committees of Congress in former years, but it has been so apparent that it would work unjustly that it has never been seriously considered. Its indorsement by the President and Attorney-General will not lead to its being given any serious consideration at this time.

J. C. W.

The Origin of Four-Cylinder Balanced Compound Locomotives.

BY CHARLES R. KING.

The origin of the balanced compound locomotive in current use at the present day is less difficult to trace than the first creation of four-cylinder engines—balanced or not balanced—which have been introduced and subsequently abandoned without their leaving much record in the history of the steam locomotive. Having regard to this it is hazardous to say positively which was the first of all four-cylinder engines and which of these was the first to be "balanced" in the sense of that term as it is, somewhat incorrectly, employed to denominate locomotives at present.

Of the numerous examples of four-cylinder engines shown at the London International Exhibition of 1862, it may be suggested, subject to correction, that the first four-cylinder balanced engine built was Haswell's "Duplex No. 169," constructed for Austrian railroads. This Glasgow engineer from the year 1838 controlled the design of locomotives turned out from the works at the Sudbahn terminus in Vienna—to-day owned by the firm of K. K. Landesbefugten Maschinenfabrik der Privilegirten Oesterreichisch-Ungarischen Staats-Eisenbahn-Gesellschaft, Vienna. The cylinders were superposed, two on each side of the engine, bolted outside of the frames. There were four cranks, each pair standing at 180 deg. to each other on one side of the locomotive and each set forming an angle of 90 deg. with the set on the opposite side of the engine. The conditions realized all that we now consider necessary to justify the appellation "balanced," and something more besides: for by reason of the trimmed cylinders converging to drive upon the same center there was a difference in the moments of maximum tangential force of 6 deg. on the same side of the engine, or of 12 deg. for the aggregate on both sides of the engine. The ideal balanced reciprocating engine should, as we know, have a difference of 40 deg. in crank positions of maximum tangential moment—an arrangement impossible in steam locomotives. In John Haswell's balanced four-cylinder locomotive the cranks on each side of the engine drive the same pair of wheels (Crampton type), the two cranks, main rods and pistons lying in different vertical planes in order to permit of the overlying of the two main rods which worked upon the same side of one wheel. This engine had four turning points—a decided advance upon the two-crank engine of Mallet (1879) and the Vaucrain (1896).

As far as can be traced the first practical application of the balanced compound system in passenger locomotives was made in the year 1884 on a simple expansion engine named "Vulcan," belonging to the Hind, Punjab & Delhi Railroad. The old cylinders of 15½-in. diameter were removed and replaced by two others of 17-in. diameter, for the second expansion, while, for the high-pressure, two new cylinders of 11¼-in. diameter were bolted outside the frames. The stroke of the four pistons was 24 in. and the diameter of the four wheels, connected, 60 in. Each group of cylinders on the same side had its cranks standing at 180 deg., those of the second group, on the other side also standing at 180 deg., the angle formed between the two groups being 90 deg.

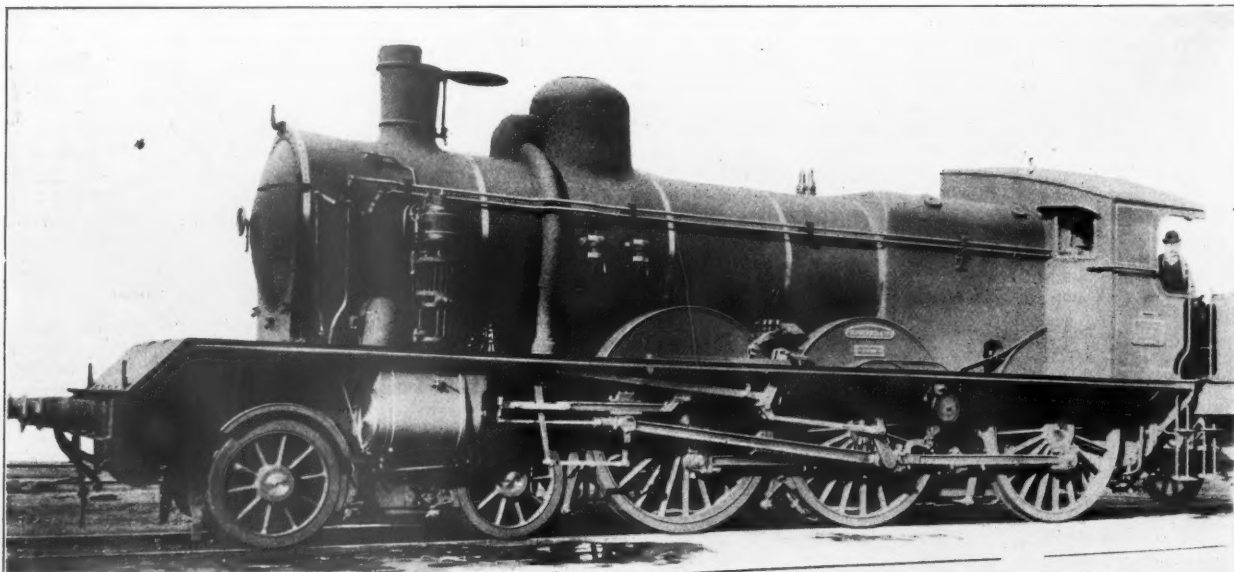
From this description we have the origin of the modern balanced compounds of central Europe which, to-day, represent the most intelligent and advanced practice in locomotive design and which carry all the records for high speeds (90 miles per hour up grade), as also for fast heavy haulage in pulling, at express speeds, five tons of train per ton of locomotive and tender in average condition of service. Of the Indian prototype the only published record of the results it gave were coal economy and augmented power.

At this stage credit must be given to those who conceived the first four-cylinder compounds. The project of Ebenezer Kemp "proposed arrangement for compounding locomotive engines," Feb. 13, 1860, appears to be the first of all multiple-cylinder compounds having only two cranks. The engine to which it was supposed to be applied was one of the Caledonian Ry. single driving-wheel engines. It may be described as a double tandem having two high-pressure cylinders one at each end of a low-pressure cylinder into which they exhausted. Passing over the Austrian engine already noted and certain abnormal "Nord" types exhibited at London in 1862, we come to the really remarkable patent, No. 1,857, June 20, 1872, of William Dawes. Three types of four-cylinder compounds are comprised. 1. Tandem. 2. Four-cylinder cross compound with

cranks at 180 deg. 3. Four-cylinder compound with two pistons driving one pair of wheels, and the other two pistons driving a second pair of wheels "without the intervention or use of coupling rods." Here, evidently, is the prototype of the first Webb compounds and of the experimental de Glehn compound "No. 701," neither of which was a balanced engine, and the only difference between which was that in the de Glehn engine the single low-pressure cylinder of the Webb compound was divided into two.

In the same patent is to be found the origin of many a start-

the scope of this paper except as a historical landmark. For the same reason the three-cylinder locomotives proposed by Jules Morandière (1886), and the first three-cylinder compounds actually built at the Struwe works, Kolomna, Russia, in 1881, as also the project of Webb for such engines in June, 1879, realized in practice in 1881, must all be passed over with the mere mention. For the same reason also the great improvement on Webb's engine made by means of an added cylinder by M. de Glehn in the experimental engine of the Nord "No. 701," proposed in 1884 and turned



The First Four-Cylinder Balanced Compound in Europe. Built for the Paris, Lyons & Mediterranean.

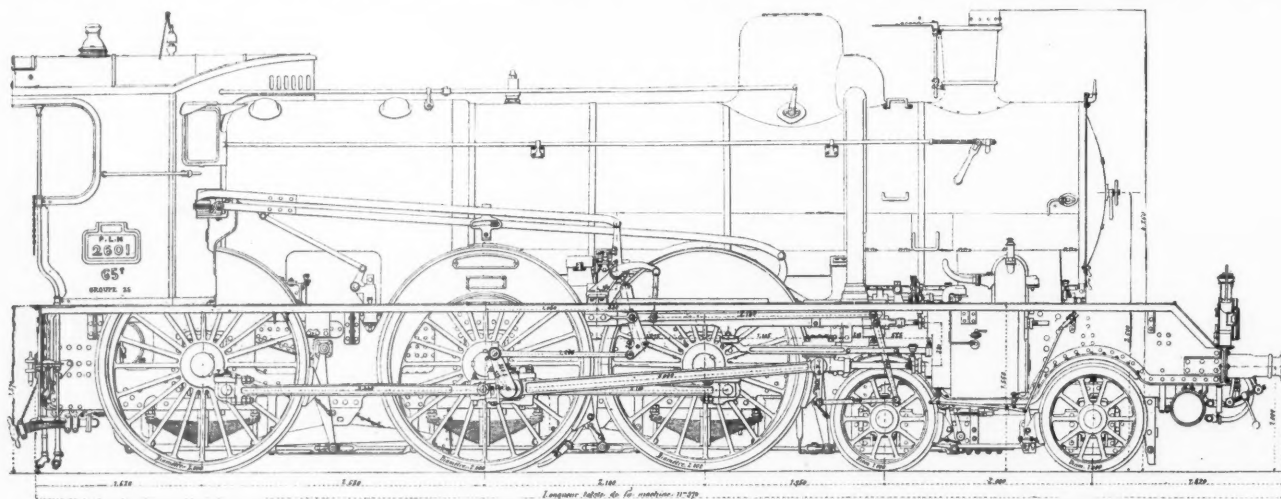
ing-gear now in use, that is, for the admission of boiler steam direct to the low-pressure cylinders automatically, by connecting any form of valve or cock, necessary for this admission, to the reversing gear, and in such way that only at full gear—as in starting—are the live steam cocks opened. Needless to add that this invention has since been repatented by others in all parts of the world, and also applied in many differing modifications.

Subsequently the tandem type, in different forms, was patented in France by M. F. de Diesbach in 1873, and also by Jules Garnier in 1874, and suggested by "the father of the compound engine," Anatole Mallet, in 1879, as communicated by him to the British Institution of Mechanical Engineers. Some new arrangements for

out of the Belfort shops in December, 1885, must be omitted, because it was not a "balanced" compound, and this simply from the insignificant detail that the side rods were not applied any more than in the Webb compounds.

The first four-cylinder balanced compounds ever built outside of Asia, that is, in Europe or America, so far as can be found, and the first regular series of four-cylinder express engines in the world—balanced or not balanced—were designed in the year 1888 by Monsieur Charles Baudry, principal mechanical engineer under Monsieur Henry, the late Chief Engineer of Motive Power of the Paris, Lyons & Mediterranean Railway of France.

These compound engines were built to the number of six for



Side Elevation of Original Four-Cylinder Balanced Compound on the P., L. & M.

the same type of compound, and applications of these types, were made on the Boston & Albany Railroad in 1883, and, later, on the North British Railway and English Great Western; also by M. du Bousquet on the French Nord line—in this latter case the machine being of the Woolf system in which the ratio of low-pressure cylinder volumes was three, a ratio which to-day is generally admitted to be the correct one for steam pressures of over 200 lbs. But this type of engine is, as are the Vaucain type and the prototype of the Vaucain invented by M. Mallet in 1879, out of

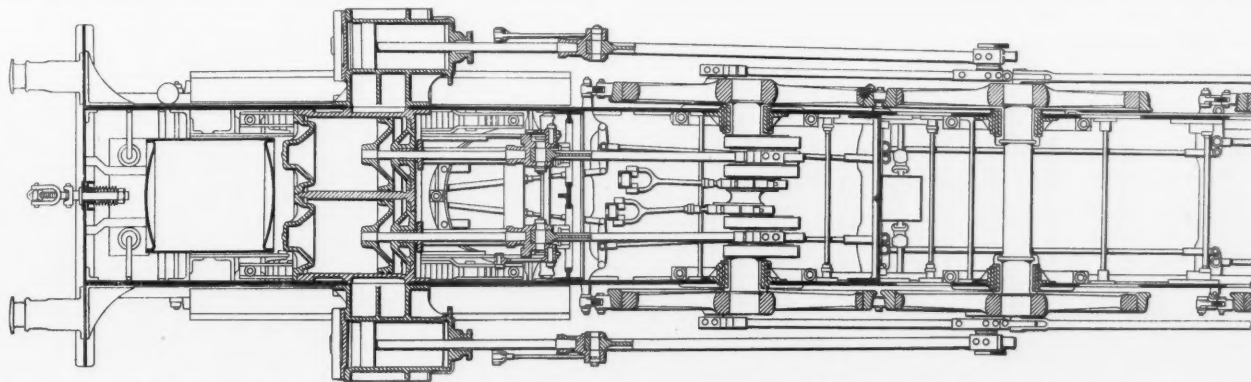
both passenger and freight service, and three of the types were shown at the Paris Exhibition (Champ de Mars) in the year 1889, the first standard types of four-cylinder compounds having four cranks, and almost perfectly balanced, that were ever constructed. These facts do not, of course, agree with the popular idea of the origin of four-cylinder compound engines, but in this case there is no alternative—other than the truth.

Not only that, but these first balanced compounds possessed original features which have in part since been embodied in the

practice of central Europe. As with all French locomotives built since that time, they took from the Webb compounds the principle of dividing up the driving effort between two separate axles. With a certain difference the location of all four cylinders underneath the front end of the boiler is just that which has since become the standard practice of central Europe. The "certain difference" just stipulated was this, that although all cylinders were bolted together *en bloc*, the inside cylinders were advanced half a length in front of the outside cylinders in order to increase the length of the inside main rods without unduly increasing the length of those outside. More displacement of the two groups in respect to each other (as for instance in the Cole locomotive) could have been effected, but this would have led to one of the notable inconven-

first to draw the attention of engineers through English periodicals in the year 1892. There is no doubt that the pioneer compounds of the P. L. M. would have done at least as well, but the conditions demanding high speed and also permitting it have always been more favorable on the French Nord than anywhere else on the Continent. This important fact is, however, never heeded by many—especially so with those who would rather never know, and they, too, are numerous.

Instead of taking into account the splendid and easy conditions of the Nord line many persons attribute the high velocities to the use of two sets of valve gears. It is therefore of great interest to note the fact that the Société Alsacienne de Constructions Mécaniques, of Belfort and Mülhausen, actually planned the new



Arrangement of Cylinders of First Four-Cylinder Balanced Compound, Showing Inside Cylinders Set Ahead of Outside Cylinders.

ences of the de Glehn arrangement—that is the difficulty of access to parts requiring attention while on the road, only in this case with the difference that it would have been the "little ends" and piston rod packings which would have been difficult of access instead of as in the de Glehn arrangement the "big ends." The Henry-Baudry solution in 1888 is to be seen repeated in the newest types of Belgian four-cylinder compounds known as Class 19 A. There is an instructive similarity between the pioneer balanced compounds of the P. L. M. and the recent engines of the G. N. R. (England), the "Cole," the Belgian "19 A," and still others which reflects much credit upon the designer of the first balanced engines, who is the present Chief Engineer of Mechanical Power of the P. L. & M. Railway (Dr. Baudry).

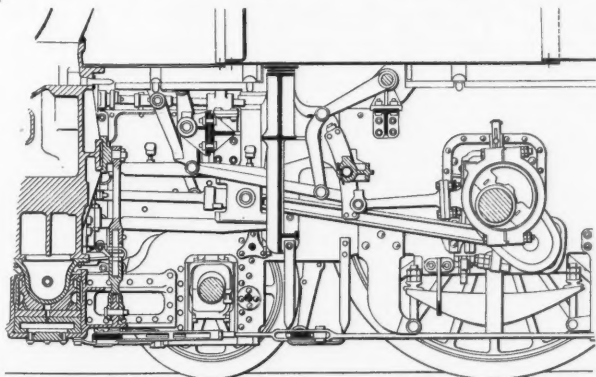
The experimental compound of M. de Glehn was engine "No. 701," introduced on the Nord under the direction of Chief Mechanical Engineer M. Edouard Delebecque. On this railroad as many as 13 side rods broke in service during the year 1886, and each of which might, as in the Loughor accident in England (1905), have caused serious disasters. It was held, then, that side rods were undesirable but very necessary. Finally M. Ferdinand Mathias, who had since become Chief Engineer, said at the Railway Congress of 1889: "If we adopt compound engines we will do like M. Henry, and accept side rods, whatever be the system." At last the plans for the Nord's first four-cylinder

"Nord" machines with only one set of valve gears (according to present-day modern practice), the outside valves being driven direct and the inside valves reversed in direction, in order also to give outside admission for the slide valves, by means of rock shafts. But M. du Bousquet insisted that two independent valve gears should be fitted and that an intercepting valve should also be applied in order to be able to run the machine, if desired, as a four-cylinder single-expansion machine.

From this point it is needless to continue the "origin" of four-cylinder balanced compounds. The subsequent machines on the Continent were either modeled after the Henry arrangement or the de Glehn arrangement, and either embodied the main principle of the Webb compounds, but with added side rods, or else followed the Indian prototype, according to the present most approved practice of central Europe, that is, cylinders on one transverse line, one driving axle (cranks at 180 deg.), and one set of valve gears. It is not easy to fix the development of this type. Monsieur Edouard Sauvage, former Chief Engineer of the central shops of the Nord at Paris, probably contributed his share on the compound engine No. 3,101 shown at the Paris Exhibition of 1889, alongside the P. L. M. pioneer balanced compounds. In this type also there was but one motor axle and the cylinders were all placed in line—but of these there were only three.

A very curious fact to remark is that while Mr. Webb in his three-cylinder compounds gave all the elements of cylinder disposition and double motor axles to nearly all existing four-cylinder French compounds, yet his own first four-cylinder compounds were arranged precisely according to the most approved European practice at the present day. Thus the two most divergent and principal forms of locomotive compound engines—the one employed in France and the other throughout the European Continent, are typified in Webb's first and Webb's second compound engines, and the merits of the one and the other are about to be investigated in the most complete, scientific and practical manner by the State Railways of Belgium with Central European types, Henry Baudry types and de Glehn types. The most interesting of all engine systems of the Central European type, that is, the "Adriatic," whose mechanical efficiency remains without an equal, does not figure in the list of newly-built Belgian balanced compounds.

From the foregoing it will be observed that it is neither the originality of a locomotive type, its relative simplicity of construction, economy in coal and maintenance, and general handiness in operation that have impressed these qualities upon the notice of the popular mind; it has been the sole item of high speed, with light load or heavy load that is of no consideration—it is the mere speed. Nor is it taken into account that 19 out of 20 unheard of locomotive types would be able, upon roads permitting it, and under conditions calling for it, to sustain the same velocities with an identical average pull at the drawbar as those of which we have heard so much from France. At present the records of highest speeds with enormous paying load (train load) per ton of engine are held by locomotives of the "Adriatic" type. If we compare the speeds attained elsewhere, upon the basis of car-load per



Section Between Frames Showing Inside Rock Levers.

compounds were prepared under M. du Bousquet in 1890—who had, in the meantime, been promoted Chief Engineer—and the first engine was delivered from the Belfort works of the Société Alsacienne in the course of 1891. Two such engines were built without side rods, but they had to be fitted afterwards with these rods, as were also the first regular series of Nord balanced compounds (2,123—2,137) built in 1893, or four years after the the P. L. M. balanced compounds. Of the remarkable speeds made by these Nord locomotives the writer, at that time living in France, was the

ton weight of locomotive we shall be severely disappointed. For mere speed alone—automobile speed—without consideration of the weight hauled per ton, locomotive history shows that the highest average velocities are attained by very old types of locomotives. For instance, in the trials of the engines which followed the exhibition of locomotives at Paris in the year 1889 it was not the Henry balanced compounds, nor any other modern engine, which carried off the record for extremely high speed—it was an old Crampton engine!

In the present article the term "balanced" compound is employed in the popular sense which so denominates a four-cylinder locomotive having four crank points at 90 deg. The really balanced engine remains yet to be built. With cranks which attain their moment of maximum force twice at each revolution—once at 85 deg. or much less, and once, on the return stroke, at 190 deg. or much more—no present-existing form of locomotive allows of such an appellation other than in a relative sense. The first four-cylinder locomotives that the writer can trace as having the cranks attaining their moment of maximum tangential force at the same degree of the cranks' revolution on opposite sides of a vertical line drawn through the axle center, were the express engines built in 1862 for the Chemin de fer du Nord when M. Jules Petiet was the Chief Engineer. But as these engines were specially built to avoid the use of side rods the engines were in reality less "balanced" than those of to-day. In the case mentioned there were two driving axles—one at each end of the locomotive, and the cylinders were placed at each extremity of the frames. In recent times a perfectly balanced four-cylinder locomotive with connected driving wheels and cranks attaining their moment of maximum force at corresponding degrees on each side of a vertical line drawn through the crank-axle center, was designed by Signor Scappini, of the Breda Locomotive Works, Milan, Italy. At the present time the writer is unable to say whether this scheme has materialized. It is generally in old marine engines that we find the most frequent examples of cranks attaining their moments of maximum tangential force at different degrees of the crank shaft's revolution.

The Henry balanced compounds of the year 1888 have been reproduced up to this day with less difference of main features or of details than has been the case with other French compound systems. The first balanced compound of Class C-1 was exhibited at Paris in 1889. The last balanced compound of the same system, of which there are nearly 600 at work, is shown this year at the Liege Exhibition. The cylinder disposition remains as in the pioneer engines of Class C-1. Piston valves giving inside admission have replaced the flat slide valves then used. Those inside the frames of Class C-1 were, however, placed underneath the inside or high-pressure cylinders. There were no inside eccentrics, motion for the Walschaert's valve gear being derived from a point on the main driving rod—as in the Joy system. The larger cylinders were placed outside of the frames and there is no doubt that at no distant date French builders will be obliged to return to this practice to provide adequate volume of cylinders for the second expansion. The pioneer balanced compounds had four valve gears, but the reversing mechanism was specially arranged so that the engineer could not alter the relative degrees of cut-off in the high-pressure and low-pressure cylinders other than in the fixed degrees allowed in the shop adjustment. In the new engines the valve travel of the low-pressure cylinders is made invariable at 63 per cent. and the high-pressure can be varied at will from 20 to 88 per cent. The long admission up to nearly 90 per cent. in starting and with cranks at 180 deg. dispenses with that troublesome appliance, the intercepting valve for exhausting the h.p. cylinders direct to the air. The invariability of the low-pressure valve travel, or else a higher fixed proportion for its degrees of admission as compared with the high-pressure valve travel, is necessary for free steaming when the low-pressure cylinders have an insufficient ratio of volume. In one case two sets of valve gears are necessary and in the other case one set suffices. The most approved practice to-day is one set of valve gears giving nearly identical cut-offs to cylinders having volume ratios of 1-3, and if this practice is adopted in France it will be either the Est or P. L. M. to take the first step. The special arrangement of the P. L. M. engines for reversing the engine and automatically setting the low-pressure valves for a cut-off of 63 per cent. in backward gear consists of a trip and self-locking gear on the low-pressure reversing bar which is quite free between the two points of 63 per cent.—back and forward—to prevent accidents to the gear if the engine be reversed. While under motion the low-pressure bar is connected to a dash pot or moderator bolted to the firebox covering. The cylinder is filled with oil and the piston plunger is perforated with holes so that any violent movement of the shaft is prevented.

The Walschaert valve-gear is reversed in the position of the radius rod on the advanced or lead-lever, as is readily distinguishable on the general view, in order to give central admission to the piston valves. The same disposition for the independent set of valve gears inside the frames is realized through vertical rocking

levers. The low-pressure valves are 280 mm. in diameter and the high-pressure 200 mm., the l.p. having a full travel of only 125 mm. and the h.p. of 145 mm. The lap given is 19 mm. for the h.p. and 34 mm. for the l.p. The lap on exhaust for the h.p. is negative 3 mm., and for the l.p. line-and-line. The cylinders have diameters of h.p. 340 mm. and l.p. 540, the piston stroke being 650 mm. The ratio of cylinder volumes is, in consequence, only 2.52. The receiver volume has been reduced to 4.95 cu. ft., and smaller clearance volumes have been adopted for the piston valves than is usual for French slide-valve engines. These average 10.1 per cent. for h.p. and 6.22 for the l.p. cylinder working volumes.

The valve gears and motion generally are neatly designed and simple in composition. Single guide bars are used—an unusual practice in France. Double bars are employed for the shorter inside main rod cross-heads. The outside guide bar is cut away to allow the lead lever to pass through its center line which lies in the same vertical plane as the valve spindle. By this means torsional strains are eliminated from the articulations of the valve gear. The guide bar is bolted to a special outside frame of cast-steel which also carries the whole of the valve motion.

To assist the engine in starting boiler steam can be admitted to the receiver by a simple non-automatic cock under the hand of the engineer and by the pipe which is visible in the outline view of the engine. As usual four suction valves are provided on the receiver at each side of the engine and others in connection with the l.p. exhaust. A relief-valve, set at 80 lbs., is also mounted on the receiver.

The pilot truck is of a novel arrangement without swinging links for carrying the pivot. It has, however, an equally flexible movement and allows of universal rotation about its spherical pivot and 34 mm. of direct lateral displacement on each side. On curves the engine is, by helical guides in the pivot box, pitched in towards the rail of shorter radius. The trailing connected pair of wheels is provided with axle boxes working on inclined planes allowing 7 mm. lateral displacement on each side. The boiler is fitted with a pair of silent action safety-valves, and is fed by two Sellers injectors of 8½ and 9½ mm.

The newest machines are designed to pull trains of 300 metric tons up grades of 0.8 per cent. (P. L. M. maximum for lowland lines) at a speed of 50 miles per hour. They are noteworthy for many interesting details and their outward aspect although less pleasing to the eye than the handsome locomotives of the de Glehn type, is still an advance upon previous models, and there is no doubt but that in a parallel service with de Glehn engines they would attain equally high speeds.

They have 3 sq. meters of grate area; 221.17 sq. meters of heating surface; boiler pressure of 215 lbs., and weigh 65.2 m. tons empty, or 70.7 m. tons fully loaded, the weight under each pair of driving wheels being 16,850 kgs.

The preceding description of the Henry-Baudry balanced compounds does not include another type employed by the P. L. M. R. R. Co. wherein all four pistons drive upon a single motor axle. Of these there are 140 machines, or a total of 731 balanced compound engines in the service of this road.

Freight and Express on Interurban Lines.

In a paper read before the Indiana Interurban Railway Association, Mr. E. Graston, Superintendent of Freight and Express of the Indiana Union Traction Company, said that the handling of freight and express on interurban lines is being found profitable and does not, in the least, interfere with passenger traffic. Even on a small scale it is showing good results, although it is yet in its infancy. An immediate hindrance to its growth is the fact that at present all companies are confining their traffic to their own lines. This is a great drawback in competition with steam railroads, as shippers naturally prefer to divert their long-haul traffic to lines where, through the interchange of traffic, they can make their shipment with only one change and consequently a minimum of expense. If the electric roads would get together and agree on through rates between their respective lines on the same basis as the steam lines and arrange for an interchange of traffic, they could handle through traffic without any noticeable increase in expense per mile, and so compete with the steam roads on equal terms. One of the greatest difficulties experienced at present is to convince shippers that the electric road is prepared to handle all kinds of freight traffic. Most of them assume that it cannot take any kind of freight except small packages. Another handicap in this competition is the lack of facilities at transfer stations. The proper freight stations and platforms should be provided with floors on a level with the floors of the freight cars; this makes it possible for the trainmen to handle freight more quickly and carefully, and makes it also more convenient for transfer men to load it on their drays. Mr. Graston says that his road is losing considerable traffic at stations not equipped with these high platforms, and that the shippers at these points say they would gladly give the road their

business if its station facilities were on a par with those of the steam roads. Good sidetrack facilities are also an important item to the traffic department in the same manner that proper stations are. They enable loaded trains to be started on the road with the least possible delay and they keep the operating expenses down to a minimum. The official classification, as agreed to by steam railroads in the territory concerned, is recommended, with the exception of the rates on a few articles which, owing to their nature, necessitates a different rate in order to be carried profitably by interurban roads. Household goods in particular are classified too low.

In making out the waybill used by the I. U. T. three carbon copies of the original are made at one writing. The waybill shows the station from, destination, date, car number, name of consignee, consignor, description of articles, weights, rate and amount of freight. The original and one copy are delivered to the conductor, who checks his freight to and from the car, and when he gets the freight to its destination delivers both to the agent. The agent, on the delivery of the freight, signs the original, which is his expense bill, and delivers it with the goods to the consignee, who signs the copy as a receipt. One of the two remaining copies is sent by the forwarding agent to the auditor, and the other is kept for his file.

Cars intended for hauling freight traffic should be from 45 ft. to 50 ft. long, and motor cars should be so equipped that they can handle trailers without difficulty. Box car trailers are recommended to take care of carload business, and as much business as possible should be handled with them, as they keep down operating expenses.

Railroad Shop Tools.

MILLING MACHINES.

(Continued.)

The accompanying illustration, Fig. 1, shows one of the latest designs of heavy rod milling machines made by the Newton Machine Tool Company, Philadelphia, Pa. The spindles are 6 in. in diameter. It has an adjustment on cross rail for convenience in setting cutters, and has a direct worm and worm-wheel drive. The worm-wheel is of phosphor bronze, and the worm of case-hardened steel running in a bath of oil through gearing by a 35 h.p. motor or is driven by a four step cone as desired; the cross-rail is of an inclined face designed to throw the thrust of the cut on the upright, and the center of the spindle is carried 4 in. below the point

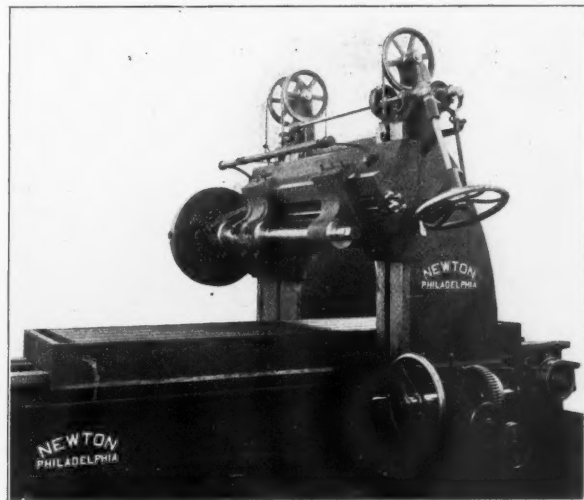


Fig. 1—The Newton Heavy Rod Milling Machine.

of the rail for "necking" rods. The design of the rail as shown, overcomes to a large extent the tendency to drop in when running from a wide to a narrow section, and being provided with a long bearing on the upright eliminates a great deal of chatter so prevalent on the older designs of tools. The uprights carrying the cross rail are made one wide and one narrow, the wide upright being 25 in. width of face and the narrow upright 12 in. width of face, the wide upright taking the strain of the drive. The cross rail is counterweighted and has both power and hand adjustment. The carriage ways are each 6 in. wide and the carriage is of extra deep section and is operated by a spiral pinion and rack. It has power quick traverse in either direction and may be fitted either with a friction disc, fed as shown, or a gear box, having nine changes of positive feed as desired. The carriage of the machine is 36 in. wide and can be made to mill any desired length; the table shown is to mill 10 ft. long, and the uprights will admit work of 40 in. wide, and the center of spindle can be

raised 30 in. from the carriage. This design of machine is made in several sizes, as a standard heavy slab milling machine, any of which can be fitted with an auxiliary vertical spindle. The operation of the machine is then the same as the machine just described. The vertical spindle provided is 4 in. in diameter, and has an independent vertical adjustment of 2 in., and is unclutched by slipping the driving pinion out of mesh and remains idle when not in use. This is particularly adapted for milling the front frames for locomotive work, and can also be used for any job within the capacity of the machine. If desired, a power feed will also be furnished for feeding the vertical spindle across the carriage. This spindle is an auxiliary feature of the machine, and is arranged as a part of the outboard bearing. A similar spindle can be fitted to the main horizontal spindle bearing when desired. The Newton Machine Tool Company has just received an order from the Amer-

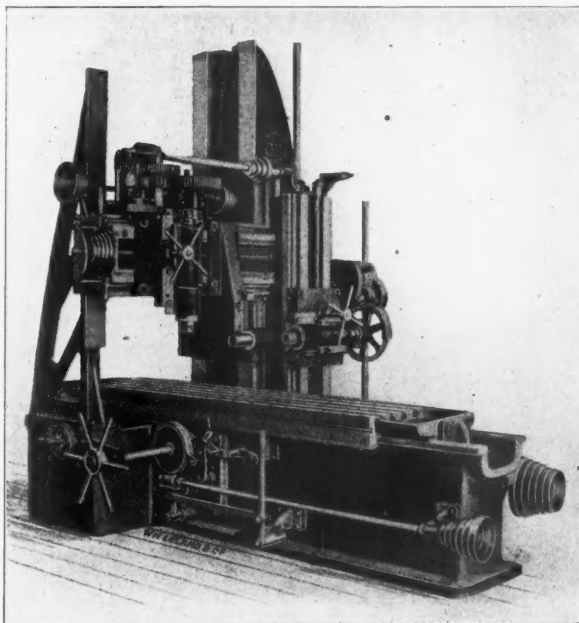


Fig. 2—The Beaman & Smith Combined Vertical and Horizontal Spindle Milling Machine.

ican Locomotive Co., Pittsburg, for two of these machines having a geared feed, and have just shipped one each to the Rock Island and C. B. & Q.

Fig. 2 shows a combined vertical and horizontal spindle milling machine made by the Beaman & Smith Company, Providence, R. I. This machine is adapted to meet the requirements of a great variety of work, due to the fact that it has two spindles, one vertical, the other horizontal. Also that the outer support for the cross-head or overhanging arm can be removed so that work can be done that would not pass between the uprights. A detachable revolving table which is not shown can also be furnished with this machine. With this attachment circular pieces can be machined with either the vertical or horizontal spindle. Any shape of milling cutter can be used with the machine. Both the horizontal and vertical spindle heads are provided with adjustments in the saddles which have horizontal and vertical movements respectively on the over-hanging arm and on the upright.

The spindles have tapered ends for face milling cutters, also taper holes for cutter shanks and arbors with retaining bolts through their centers. With them any form of cutter can be used to advantage. They can be driven in unison, or singly, the horizontal in either direction; and as the double back-gearing for each is attached to its respective head, it admits of different speeds being used simultaneously. The table is provided with power quick movement in either direction, and also is provided with automatic feeds arranged so as to maintain a desired rate at any spindle speed. It has five tee slots and six rows of holes for stop pins. The cross-head, or over-hanging arm, is substantial and is capable of supporting the spindle when the left-hand upright is removed, it being detachable to facilitate operating on larger work than would otherwise be the case. The cutter arbor support for the horizontal spindle is also detachable. The table has a working surface 24 in. wide, 8 ft. long and 9 ft. movement on bed, and is provided with a power quick movement of 15 f.p.m. The feeds of the table vary from 1 in. to 8 in. per min., and the feeds of the vertical spindle saddle on the cross-head varies from 1/2 in. to 4 in. per min.; in either direction the total cross feed is 32 in. The power is transmitted by a 5-in. belt on a four-section cone from 14 in. to 20 in. diameter, through gearing in the ratios of 6 2/3 and 16 1/2 to 1, pro-

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viding eight speeds from 12 to 64 r.p.m. The spindles each have tapered ends $3\frac{1}{4}$ in. diameter, and also have a No. 12 Brown & Sharpe taper hole. They have 6 in. of independent adjustment.

The following figures will give a general idea of the capacity of this machine. The center of the horizontal spindle is 6 in. in advance of the vertical spindle. The distance from the top of the table to the spindle varies from 3 in. to 36 in. The distance from the end of the spindle to the detachable upright is 40. The distance from the end of the vertical spindle to the table varies from 0 to 54 in., and the distance between the uprights is 41 in. The countershaft has one tight and one loose pulley 18 in. diameter for a $5\frac{1}{2}$ belt to run at 300 r.p.m. The weight is approximately 26,000 lbs.

(To be continued.)

Railroad Development in Japan.

BY GEORGE E. WALSH.

While the large orders which Japan has recently placed for electrical equipment and heavy machinery of all kinds are only preliminary to the awakening of the country, they indicate the line of development which the people of the empire are likely to follow. Accepting only the best and most modern machinery, their industrial progress must be characterized by great strides. In respect to its steam railroads, Japan starts with the handicap of many miles of narrow gage road and a good deal of old machinery and track equipment. However, this will not long remain true, for the shipment of modern American locomotives and coaches to Japan has been going on steadily now ever since last winter. Even during the uncertainty of the recent war Japan was buying American cars and locomotives, besides track equipment and other accessories, and the danger of capture by Russian ships did not interfere with this traffic. Including the repairs and extensions of the railroads in Korea and Manchuria, Japan has been a most diligent railroad builder during the last year, and this was carried on when her people had a great war on their hands, and in the face of great financial difficulties.

Japan has borrowed her ideas of railroad building from her two greatest friends—England and America. Her railroad and construction engineers received their education in one or the other of these two countries, and many of them have visited the shops and plants in this country within the current year to renew their acquaintance with the best railroad practice. The country is physically unsuited to great railroad development. The mountain systems break it up into many small districts, so that railroads have either to climb steep grades, cut through mountains or skirt their bases in the most exasperating way.

Yet Japan is preparing for complete reorganization of its railroad system. In 1902 it had upward of 5,000 miles of railroad, but to-day, if we include the Korean and Manchurian possessions, has more than 8,000 miles. There are upward of 2,000 locomotives, 6,000 modern carriages or coaches, and 20,000 freight cars or wagons for carrying goods. American locomotives are gradually displacing the old type of engines that were designed in England, Germany or the home shops. More English coaches, with side doors, are found in Japan than those of the American type, but the latter are steadily making headway. In their friendly sympathy with England the Japanese railroad companies placed orders for freight cars and coaches with English firms, but their leaning to advanced types of all machines and implements has lately convinced them of the superiority of the American cars. A few recent orders have even included American pressed steel freight cars, and these have been placed on the new lines running to the interior mines.

The leading roads have adopted the American engines almost entirely. There are over 30 engines in the Government railroad service built in this country in 1902, and more than a dozen more have been ordered since. These locomotives were built at Schenectady by the American Locomotive Company, with 60 in. drivers, and cylinders 16 x 22 in. They are used for the ordinary first class trains which travel on comparatively level stretches of track. On trunk lines, where the grades are heavy special mogul engines have been in use for two or three years. The first of these mogul engines were made in England, but the later ones were built in this country. American representatives of the railroad companies are now in Japan making careful estimates of the needs of the new lines of roads projected and contemplated. Owing to the sharp grades of some of the new lines it will be necessary to use engines of large size and power. Japanese engineers who have been in this country in the past year to study railroad conditions expressed themselves as pleased with the type of locomotives used in the Rocky Mountains. From present indications it seems likely that Japan will order a number of similar locomotives for their heavy grade work.

Before the war with Russia the Japanese engineers had established a locomotive building and repair plant at Kobe. From this shop several good consolidation engines were made and are now doing service. This plant was largely of an experimental nature,

but it is now working overtime to supply the demand. The most recent orders from this shop are compound, two-cylinder engines, weighing 40 tons, with 15 x 22 in. cylinders, and driving wheels 53 in. in diameter. The completion of these engines was considered an important day for Japan, and their maiden trips were made amid a good deal of enthusiasm and public recognition. But while this plant has performed some excellent work, and duplicates of it are likely to spring up in other places, it is not likely that Japan can depend upon its home manufacturers for many years.

The early railroads of Japan were very crude affairs, and they have had to be torn up and rebuilt over their entire length. Flimsy wooden bridges and trestle work, and very imperfect roadbeds characterized the routes. They were, however, well laid out, and they must continue to be the main arteries of traffic. The replacing of the wooden bridges by iron and stone structures has been carried on steadily ever since 1870, when the railroads were partly reorganized by the order of the Emperor. The iron bridges were made at home and in England. The latter country for a time had a monopoly of bridge building, and English engineers designed most of the structures in Japan of this character. Stone, concrete, and iron bridges have now been placed over nearly all of the important streams and mountain chasms.

One of the largest and most important of the bridges is over the river Tenriu. This is a bridge of 19 spans, and is about three-quarters of a mile long. It is built entirely of iron and steel, with solid stone and concrete foundations. Another bridge, over the river Oi is of 16 spans. The railroads cross the rice fields in many places, carried either by trestle work or by numerous small bridges joined together. Valleys, rivers and tunnels are frequent, and one travels through an ever changing panorama. The rivers and small streams with sources in the steep mountains rise with great rapidity in the rainy seasons, and the bridges have to be made large and strong. In all railroad engineering in Japan the bridge, culvert and tunnel problems stand out conspicuously, as do also the questions of route and grade. The country rises abruptly from the seashore, and it is difficult to provide easy grades to the interior.

At one point where a mountain range has to be crossed there is a rise of 1,138 ft. in less than 12 miles. To climb this steep grade the best American mogul engines are used, and they perform their work with general satisfaction. Along another part of this route gradients of 1 to 40 extend over a distance of 15 miles. In crossing the Sekigahara Pass there is a rise of 750 ft. within a ride of 12 miles. The constant rise and fall of the grade causes a good deal of wear and tear to the rolling stock, but none of these steep grades can be avoided without extensive blasting and boring of tunnels.

Unfortunately for the future of the Japanese railroads they adopted the 3 ft. 6 in. gage, and the question of replacing the most important tracks with standard American gage has been seriously considered. It seems only a question of time before these roads will fail to accommodate the increasing traffic of the country; but for the present there is little likelihood of a change. Japan needs more roads, and money will be invested in these rather than in tearing up old tracks. The inconvenience of the narrow gage has been partly offset by increasing the width of the rolling stock so that freight traffic is not so seriously handicapped. The most apparent drawback as a result of the gage is the limit of the speed. This is placed at 40 miles an hour for the better class express train service.

The Japanese engineers have been progressive in their adoption of modern equipment of operation. Block signal systems are used on the main government lines, and the vacuum brake is pretty generally employed. The tendency is to improve the rolling stock so that any disadvantage of curves and roadbed can be partly overcome. Electric alarm signals at crossings and even electric train lighting have been installed on some of the short lines. One thus finds examples of the best English and American practice, and to a traveler many such pleasing reminders of home cannot fail to impress him with the advanced methods of Japanese railroading. Courtesy is characteristic of the Japanese, and the railroad employees and officials are models of propriety, and obliging servants.

The minuteness of the regulations on the Prussian State Railroads may be inferred from a recent order, adding to the instructions for preventing accidents recently issued from the ministry. This directs that in powdering carbide and the preparation of poisonous colors, the making of dust must be avoided, and the workmen must wear respirators. Instructions are given for the preparation of such colors, and especially of lead colors. The workmen engaged in such work must not smoke, chew or take snuff while at work. They must avoid soiling and working clothes with the colors, and hair, beard and finger nails must be kept cut short. They may not eat or drink nor leave the place where they work until they have changed their working clothes, brushed hair and beard, and washed face and hands thoroughly with soap, where possible with pumice stone or marble-dust soap, cleansed the nostrils and rinsed out the mouth; and then the eating and drinking must not be in the room where they work.



GENERAL NEWS SECTION

NOTES.

According to a western reporter, Traffic Director J. C. Stubbs, of the Union and Southern Pacific lines, travels 65,000 miles a year.

The Government has begun a suit in the Federal Court at Portland, Ore., against the Southern Pacific for violation of the Safety Appliance Act.

The Pennsylvania has created the office of Statistician of the Freight Department. The duties of the office will be to collect and compile industrial and commercial statistics and to handle subjects relating to the development of freight traffic.

During the month of November the eastbound traffic through the Soo canals amounted to 4,074,030 tons, and the westbound traffic was 932,513 tons. The number of vessels passing through the canal was 2,357, their total registered tonnage being \$4,208,325.

The transcontinental railroads in conjunction with other lines east of Chicago, and with Atlantic steamship lines, have made a rate on oranges of \$1 per 100 lbs. from California points to London and other European cities, which is 25 cents less than the rate to New York.

The Southern Pacific has finally resumed full passenger train service between Houston, Tex., and New Orleans, after the suspensions due to the yellow fever; the new time table went into effect November 21. There are still two or three points at which quarantines are continued.

According to a Washington (D. C.) newspaper the Pennsylvania road has ordered 20,000 honeysuckle vines, which are to be planted on the sides of the embankment on which is being built the company's new line from near the capitol westward to the Potomac river. This line runs through a public park.

The new or amended suit of the Government against the Terminal Railroad Association of St. Louis, asking the dissolution of the Association because of its maintenance of a monopoly in the use of the two bridges across the Mississippi river, was filed in the Circuit Court at St. Louis, November 29.

It is announced in Wheeling, W. Va., that the Baltimore & Ohio has abrogated its order forbidding the use of B. & O. cars for shipments going to foreign roads; though in the case of box cars shippers are asked to notify the agent in advance so that he can secure foreign cars for shipments going to foreign points.

The Grand Trunk Pacific has secured extensive coal fields near the Pacific Coast, and has lately paid the first installment of \$5,000,000 for the Cassiar fields. These are 60 miles east of Laurier, the Pacific terminus of the road. It is said that the property includes 42 square miles of coal lands containing coal of high quality.

The Chicago *Record-Herald* says that the Atchison, Topeka & Santa Fe, on whose line occurred the disastrous wreck of October 30 (Sheffield, Mo.), has given an order to discontinue the use of old and comparatively weak passenger cars in the front ends of trains, and has ordered 55 new smoking cars to take the place of these old ones.

The railroads carrying grain from points in Illinois to the Ohio river have announced an increase of two cents per 100 lbs. to Louisville and to Cincinnati. This is the result of the conferences over the complaints of shippers that the rates to the cities named were too low as compared with those on grain which goes through Cairo and other points west of Louisville.

At Pittsburg last week Judge Buffington, in the United States District Court, granted writs of alternative mandamus on officers of the Pennsylvania Railroad to compel a fair distribution of cars to coal shippers. The Hillside Coal & Coke Company had charged that the railroad company furnished it only a small portion of the cars needed and had shown favoritism to other shippers.

Press despatches from Chicago say that the Chicago, Milwaukee & St. Paul has taken contracts to carry several thousand cars of corn from the Missouri river to the Atlantic seaboard at rates of 30 cents from Omaha to Liverpool, and 28.5 cents from Kansas City to Liverpool. The report says that these through rates are 3 cents less than those prevailing from Missouri river points to Liverpool by way of the Gulf of Mexico.

A Pittsburg paper reports that there is extensive lamentation in the City Hall of that city because of a notice received by the Mayor from Mr. Pitcairn, of the Pennsylvania, that the fountain

from which have issued railroad passes for city officials and their friends has been frozen up. So many passes have been issued that "the free passengers have crowded out those who had paid their fare"; the company was obliged either to lengthen its trains or cut off the passes.

"The New Line" steamers between New York and Fall River, the line managed by Mr. George W. Brady, now carries passengers from New York to Fall River for \$1 (round trip, \$1.50); to Providence, \$1.15, and to Boston, \$2. The boats of this line are the "Palatial" steamers Kennebec and Frank Jones. The fare by the Joy Line to Providence is \$1, and to Boston \$2. The regular Fall River Line has reduced its fare to \$1.50 to Fall River and \$2 to Boston—the latter a reduction of 50 per cent. from the full summer rate.

"A Big Conference About Signals" is the title given by a Philadelphia paper to an item about a meeting of officers of the Pennsylvania Railroad which was held in that city last week. This means, presumably, the conference between the General Manager and the superintendents and other division officers whom he has invited, to discuss the recommendations made in the elaborate report on signaling of Messrs. A. H. Rudd and Frank Rhea, recently presented to the General Manager. Messrs. Rudd and Rhea have made an exhaustive study of the whole subject of railroad signals, and, it is said, have presented numerous radical recommendations.

On December 2 the Wabash Railroad put in effect throughout its main lines a symbol time-freight system for insuring the prompt report by telegraph to the chief office of the movements of all cars of time freight. General Traffic Manager D. O. Ives announces that the fast freight lines running over the Wabash are to be consolidated. On January 1 Mr. Signer, Manager of the Lehigh & Wabash Dispatch at Chicago, will be made Assistant General Freight Agent of the Wabash, with office at St. Louis, and will have charge of all of the Wabash fast freight line business. The Hoosac Tunnel Line, the Lehigh & Wabash and the Ontario Dispatch will be practically abolished.

Readers who have been annoyed by the "delays of the law" may find a little refreshment in a news item from Summit, N. J., where, according to the *New York Times*, the Mayor has cut down the poles of a telephone company because the company attempted to do business in the city without first obtaining a franchise; where the Common Council has torn down the bridges of the Rahway Valley Railway Company because they had been built without permission; and where passengers, displeased at the action of the Lackawanna Railroad in putting up a barrier between the eastbound and the westbound stations, made a "rush" and broke down a door. This was to facilitate their access to the 6.35 a.m. train for New York.

The suit of the Government against the Atchison, Topeka & Santa Fe and other roads, for giving rebates, which embraces both the Colorado coal cases, wherein Mr. Paul Morton was so prominent, and the Kansas salt cases, has been dismissed by Judge Phillips in the District Court at Kansas City for want of jurisdiction. Judge Phillips says also that the present suit would have no standing whatever except for the Elkins law, passed in 1903; but the suit was begun in 1902, and therefore cannot enjoy the benefit of the Elkins law. He says that the question should be decided by the United States Circuit Courts of Kansas and Colorado; he also says that in cases of this kind the greatest offender is the shipper; but in spite of this "the Government, instead of going directly after the shipper under the law, seeks alone by a contempt proceeding to punish the railroad company which has been held up by the shipper. The Government will never strike at the root of the rebate evil until it goes after the shipper as well as the railroads. It is not fair play and a square deal that the railroads should first be held up by the shipper and then punished by the Government for being held up while the shipper gets the rake-off."

Master Car Builders' Association Circular of Inquiry.

The standing committee on brake-shoe tests calls attention to the existence of specifications governing the frictional qualities of brake-shoes. At a meeting of the committee, held at Indianapolis October 10, it was agreed that some inquiry should be made to ascertain the quality of shoes now being supplied railroad companies with reference to these specifications. To this end the committee has made preparations to test shoes submitted by railroad companies. Any railroad company may submit any number of shoes, but in case duplicates are received in large numbers the committee reserves the right to select for test a portion only of the whole

number. If the number is not large, all shoes submitted will be tested. Shoes should be taken from service and should be about one-third worn. They should be marked as follows: Name of the manufacturer; name of the road; whether taken from freight or passenger service. They must be shipped prepaid, either by freight or express, to M. C. B. Association, care of W. F. M. Goss, Purdue University, Lafayette, Indiana. They should be shipped as soon as practicable, and in no case should shipment be delayed beyond January 10. Contributing companies will be under no expense for testing beyond that incident to the shipment of the shoes. They will receive the results of the tests in the report of the committee.

The Recent History of Federal Control of Railroads in the United States.*

BY W. M. ACWORTH.

(Continued from page 170.)

The development of the idea of community of interests brings the railroad history practically down to our own day. In spite of all obstacles and temporary checks, there can be no doubt that the situation to-day is immeasurably better than it was eighteen years ago. Railroad companies have become on the whole law-abiding bodies. Complaints of rates, extortionate and unreasonable in themselves, are, on the evidence of the chairman of the Interstate Commerce Commission, "practically obsolete." Secret rebates are now—so I have been personally assured by men who speak with authority—no longer given, though undoubtedly they have been given till very recently. Where discriminations exist, between localities or between different classes of traffic, they are justified—or at least *bona fide* claimed to be justified—by the attendant circumstances. But there are still admittedly abuses in need of reform. In certain trades, more especially in live stock and perishable freight, the special cars required are furnished not by the railroad companies but by private persons, and some of the railroad companies appear to have paid a quite indefensible amount of mileage to these private firms, so as to induce them to operate their cars over the one road only. Another abuse which still exists is in connection with private sidings. A manufacturing company, with a mile of private siding, registers itself as a railroad company, and then obtains from the railroad company with which its siding is connected possibly 20 per cent. of the total rates for all the traffic passing over the siding. Nominally this is an agreed division of the through rates; in effect it is a bribe to induce the manufacturing company not to consign by a rival route. A friend of mine at the head of a great manufacturing concern said to me in New York last spring that competitors were in this manner getting such advantages over his concern that he thought he would be obliged to get a charter as a railroad company. "Don't do that," I said, "remedial legislation must come next session, and then you will have had all your expenditure for nothing." "Oh," replied my friend, "the cost would be infinitesimal; we have a shunting engine already. All we should need to do would be to paint the name of the new company on the tender."

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(To be continued.)

More American Rails for Australia.

Another contract for rails to be shipped to Australia has been let in this market, the New South Wales Government railway commissioners having ordered 6,000-odd tons through their representatives in New York, the Australasian merchant house of R. W. Cameron & Company. The contract has been allotted to the United States Steel Products Export Company, the foreign end of the United States Steel Corporation. Deliveries are to begin inside of thirty days. The entire shipments will be completed within three months.

The Lackawanna Steel Company recently obtained a contract for some 6,000 tons of rails for the Victorian State Railways. The price quoted delivered in Melbourne was a shade above \$27.50 a ton. This low figure was arrived at because of the then existing ocean freight rate being only 15 shillings a ton. The rails will cost \$2.80 a ton to carry from the Buffalo mills to seaboard. The combined cost of transportation, including lighterage at this end, is only about \$6 a ton. The ocean freight on the New South Wales order will, however, be 27s. 6d., as the American and British shipping lines engaged in the Australian trade last week consummated a working agreement after a rate war of many years' stand-

*A lecture delivered on Oct. 25, at the School of Economics, University of London.

ing, with the result that freight charges have shot up in some instances nearly 100 per cent. The rails just ordered will be subject to a total freight rate, including lighterage, of upwards of \$10 per ton.

The New South Wales Government railroad system, which is more than 3,000 miles in length, is constructed and operated on American lines to a greater extent, probably, than any other foreign road. The major portion of the rails, locomotives, cars and bridge material is of American manufacture.

Montana in the Senate.

The *Record* has waited with what it deems to be a commendable degree of patience for Senator W. A. Clark to define his position on the matter of railroad rate legislation. Interviews with Mr. Clark have appeared in almost endless number. He discusses art, his private car, and the distribution of seeds, but the nearest, and, indeed, the only point of contact between Senator Clark's views and the railroad rate legislation plan is this paragraph:

"In the matter of the proposed Federal control of railroads, I can say I favor the idea, as it appears primarily. Of course, there are so many different interpretations of that expression that one's decision must be qualified."

Mr. Clark gives us a stone when we ask for bread. His manner of dodging the issue is not even clever. It has not the merit of being cunningly evasive. Either Mr. Clark must say that he will uphold the President's hands and thus, in some degree at least, earn the name of Senator, which the people of Montana have bestowed upon him, or he must further give confirmation to the belief, long and universally prevalent, that the interests of Montana are of little concern to him. Will he direct his newspapers and political friends to help Montana in a time of dire need, or will he merrily whisk down Pennsylvania avenue in his automobile and let the people fight their own battle?—*Helena Record*.

Isthmian Canal Appropriation.

A bill has been introduced in the Lower House of Congress to provide for an immediate appropriation of \$16,500,000 to be used to carry on the work of building the Panama Canal. The bill provides that the Treasury shall ultimately be reimbursed out of the proceeds of the sale of bonds authorized to be issued to secure funds for this work, and requires a detailed statement of the expenditures from this and subsequent appropriations to be made annually to Congress.

Data Wanted Regarding Fire Tests.

At a recent meeting of Committee P on Fireproofing of the American Society for Testing Materials, it was decided to consider, for the present, the establishing of a standard fire test for fireproof floors only. For this purpose, the committee will endeavor to collect all available data on fire tests of fireproof floors and information resulting from the study of fires and conflagrations, more particularly as to the temperatures reached and the duration of the same. It is proposed to analyze and study this information, then publish the same with the hope of drawing forth suggestions and criticism from all who may be interested.

It is the earnest desire of the committee to make the record of past tests as complete as possible, and it will greatly appreciate the kindness of those who may possess such information if they will forward the same to the committee. Such information may be sent to Professor Ira H. Woolson, Chairman of the committee, at Columbia University, or to R. P. Miller, Secretary, 141 East 40th street, New York City, N. Y. If copies of reports cannot be forwarded, reference to the journals in which the reports have appeared may be given.

Discrimination in Favor of Railroad Company's Mines.

The Interstate Commerce Commission, in an opinion by Commissioner Fifer, has announced its decision in favor of the complainant in the case of the Red Rock Fuel Company against the Baltimore & Ohio Railroad. The road declined to permit a side-track connection between its line and a side-track to complainant's coal mine in the Fairmount district of West Virginia for the purpose of receiving interstate shipments of coal from such mine, although it has provided and maintains side-track connections for other mines in that district from which large quantities of coal are shipped to interstate destinations. It is also found by the Commission that the railroad company controls, through ownership of capital stock, large coal mining enterprises in the Fairmount district, which, during the year 1904, shipped more than one-half of the tonnage from that district. The complainant purchased the right of way for a side-track and the physical conditions pertaining to the proposed connection are found to be at least as favorable as those pertaining to connections already made for other mines in that coal field. It also appears that as between complainant's and the favored mines similarity of situation exists in essential respects; that under such discrimination the complainant is unable to make interstate shipments of coal from its mine, and the defendant, by continuing its policy of denying these facilities to applying owners of coal lands, may practically control in its own interest all of the undeveloped coal in this field as well as derive greater

profits from its own holdings in mines already developed in that section.

The jurisdiction of the Commission was questioned by the carrier, but the Commission holds that this is a case of discrimination in facilities or instrumentalities of shipment or carriage, and that its jurisdiction extends to any case of wrongful prejudice resulting from discrimination in the provision of such facilities or instrumentalities, including side-track connections. The decision is that the discrimination is not only wrongful as between complainant and other more favored shippers, but amounts to undue and unreasonable preference by the carrier of itself, and that an order forbidding further violation of section three of the statute should issue accordingly.

Railroads Inquiring for European Cars.

Owing to the fact that the unprecedented contracts recently placed with the various car-building plants throughout the country precludes the filling of big new orders for some months to come, it is reported that one of the Eastern roads is inquiring in Europe—both in England and on the Continent—with a view of placing a substantial contract for cars to be imported should better terms of delivery be secured than can be obtained on this side under present conditions.

It is estimated that the various railroad equipment companies comprising the American Car & Foundry Company, the Pressed Steel Car Company, the Pullman Company, the American Locomotive Company, the Baldwin Locomotive Works, etc., have on their books unfilled contracts representing in the aggregate no less a sum than a quarter of a billion dollars. The American Car & Foundry Company's different shops are reported to be taxed to the utmost capacity for a period extending well into the spring of 1907.

M. M. Association Circular of Inquiry.

The Committee on Classification of Locomotive Repairs of the Master Mechanics' Association has sent out the following circular of inquiry to members of the Association:

1. How do you distinguish between engines in service and those undergoing or waiting repairs, whether in roundhouse or shop?
2. If you have a limit, how is it defined?
3. If defined by considering an engine out of service if held for repairs for a certain time such as 24 or 48 hours, does that time commence when an engine is called for and not ready, or does it commence when an engine arrives at the roundhouse?
4. Do you make any distinction between running and shop repairs?
5. If so, how is the distinction defined?
6. Have you any classification of shop repairs?
7. Please send with your reply five copies of your classification of shop repairs.
8. Do you advocate any system of classification distinguishing between engines in service and those under repairs, between running and shop repairs, and any system of classifying shop repairs other than that you are now using. If so, describe the system you would recommend and give reasons for its use.

Members are requested to forward their replies promptly to H. H. Vaughan (Chairman), Superintendent Motive Power, Can. Pac. Ry., Montreal, Canada.

Manufacturing and Business.

The Goodwin Car Company has moved its offices from 96 Fifth avenue to the Whitehall Building, 17 Battery Place, New York.

Joel Bernice Ettinger has been appointed western manager of the S. A. Woods Machine Co., Boston, Mass., with offices in the Railway Exchange Building, Chicago.

The Guayaquil & Quito has let a contract to the American Bridge Company for nearly 100 small bridges to span the chasms and ravines along its line in the Andes.

W. W. Young, formerly General Agent, and recently Acting Purchasing Agent, has been appointed Purchasing Agent of The Union Switch & Signal Co., Swissvale, Pa.

E. B. Leary has been appointed as department manager of the Pittsburg department of the U. S. Metal & Mfg. Co., New York, former Department Manager Eugene L. Caton having resigned.

H. W. Edwards, Mem. Am. Soc. C. E., who resigned as Chief Engineer of the Chihuahua & Pacific last August, upon the completion of its construction, has opened an office as consulting engineer at 80 Broadway, New York.

The St. Louis Car Company has secured an order for 700 of its standard reversible car seats, covered in rattan with top rail and nickel-plated trimmings, from the Anglo-Argentine Tramway Company, of Buenos Ayres, South America.

The American Railway Equipment Co., of San Antonio, Tex., has been organized with a capital of \$100,000 to make railroad equipment. The incorporators include: John Hendricks and C. W. Gill, of Galveston, and D. F. Youngblood, of San Antonio.

The Coale Muffler & Safety Valve Co., Baltimore, Md., announces

number. If the number is not large, all shoes submitted will be tested. Shoes should be taken from service and should be about one-third worn. They should be marked as follows: Name of the manufacturer; name of the road; whether taken from freight or passenger service. They must be shipped prepaid, either by freight or express, to M. C. B. Association, care of W. F. M. Goss, Purdue University, Lafayette, Indiana. They should be shipped as soon as practicable, and in no case should shipment be delayed beyond January 10. Contributing companies will be under no expense for testing beyond that incident to the shipment of the shoes. They will receive the results of the tests in the report of the committee.

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(To be continued.)

More American Rails for Australia.

Another contract for rails to be shipped to Australia has been let in this market, the New South Wales Government railway commissioners having ordered 6,000-odd tons through their representatives in New York, the Australasian merchant house of R. W. Cameron & Company. The contract has been allotted to the United States Steel Products Export Company, the foreign end of the United States Steel Corporation. Deliveries are to begin inside of thirty days. The entire shipments will be completed within three months.

The Lackawanna Steel Company recently obtained a contract for some 6,000 tons of rails for the Victorian State Railways. The price quoted delivered in Melbourne was a shade above \$27.50 a ton. This low figure was arrived at because of the then existing ocean freight rate being only 15 shillings a ton. The rails will cost \$2.80 a ton to carry from the Buffalo mills to seaboard. The combined cost of transportation, including lighterage at this end, is only about \$6 a ton. The ocean freight on the New South Wales order will, however, be 27s. 6d., as the American and British shipping lines engaged in the Australian trade last week consummated a working agreement after a rate war of many years' stand-

*A lecture delivered on Oct. 25, at the School of Economics, University of London.

ing, with the result that freight charges have shot up in some instances nearly 100 per cent. The rails just ordered will be subject to a total freight rate, including lighterage, of upwards of \$10 per ton.

The New South Wales Government railroad system, which is more than 3,000 miles in length, is constructed and operated on American lines to a greater extent, probably, than any other foreign road. The major portion of the rails, locomotives, cars and bridge material is of American manufacture.

Montana in the Senate.

The *Record* has waited with what it deems to be a commendable degree of patience for Senator W. A. Clark to define his position on the matter of railroad rate legislation. Interviews with Mr. Clark have appeared in almost endless number. He discusses art, his private car, and the distribution of seeds, but the nearest, and, indeed, the only point of contact between Senator Clark's views and the railroad rate legislation plan is this paragraph:

"In the matter of the proposed Federal control of railroads, I can say I favor the idea, as it appears primarily. Of course, there are so many different interpretations of that expression that one's decision must be qualified."

Mr. Clark gives us a stone when we ask for bread. His manner of dodging the issue is not even clever. It has not the merit of being cunningly evasive. Either Mr. Clark must say that he will uphold the President's hands and thus, in some degree at least, earn the name of Senator, which the people of Montana have bestowed upon him, or he must further give confirmation to the belief, long and universally prevalent, that the interests of Montana are of little concern to him. Will he direct his newspapers and political friends to help Montana in a time of dire need, or will he merrily whisk down Pennsylvania avenue in his automobile and let the people fight their own battle?—*Helena Record*.

Isthmian Canal Appropriation.

A bill has been introduced in the Lower House of Congress to provide for an immediate appropriation of \$16,500,000 to be used to carry on the work of building the Panama Canal. The bill provides that the Treasury shall ultimately be reimbursed out of the proceeds of the sale of bonds authorized to be issued to secure funds for this work, and requires a detailed statement of the expenditures from this and subsequent appropriations to be made annually to Congress.

Data Wanted Regarding Fire Tests.

At a recent meeting of Committee P on Fireproofing of the American Society for Testing Materials, it was decided to consider, for the present, the establishing of a standard fire test for fireproof floors only. For this purpose, the committee will endeavor to collect all available data on fire tests of fireproof floors and information resulting from the study of fires and conflagrations, more particularly as to the temperatures reached and the duration of the same. It is proposed to analyze and study this information, then publish the same with the hope of drawing forth suggestions and criticism from all who may be interested.

It is the earnest desire of the committee to make the record of past tests as complete as possible, and it will greatly appreciate the kindness of those who may possess such information if they will forward the same to the committee. Such information may be sent to Professor Ira H. Woolson, Chairman of the committee, at Columbia University, or to R. P. Miller, Secretary, 141 East 40th street, New York City, N. Y. If copies of reports cannot be forwarded, reference to the journals in which the reports have appeared may be given.

Discrimination in Favor of Railroad Company's Mines.

The Interstate Commerce Commission, in an opinion by Commissioner Fifer, has announced its decision in favor of the complainant in the case of the Red Rock Fuel Company against the Baltimore & Ohio Railroad. The road declined to permit a side-track connection between its line and a side-track to complainant's coal mine in the Fairmount district of West Virginia for the purpose of receiving interstate shipments of coal from such mine, although it has provided and maintains side-track connections for other mines in that district from which large quantities of coal are shipped to interstate destinations. It is also found by the Commission that the railroad company controls, through ownership of capital stock, large coal mining enterprises in the Fairmount district, which, during the year 1904, shipped more than one-half of the tonnage from that district. The complainant purchased the right of way for a side-track and the physical conditions pertaining to the proposed connection are found to be at least as favorable as those pertaining to connections already made for other mines in that coal field. It also appears that as between complainant's and the favored mines similarity of situation exists in essential respects; that under such discrimination the complainant is unable to make interstate shipments of coal from its mine, and the defendant, by continuing its policy of denying these facilities to applying owners of coal lands, may practically control in its own interest all of the undeveloped coal in this field as well as derive greater

profits from its own holdings in mines already developed in that section.

The jurisdiction of the Commission was questioned by the carrier, but the Commission holds that this is a case of discrimination in facilities or instrumentalities of shipment or carriage, and that its jurisdiction extends to any case of wrongful prejudice resulting from discrimination in the provision of such facilities or instrumentalities, including side-track connections. The decision is that the discrimination is not only wrongful as between complainant and other more favored shippers, but amounts to undue and unreasonable preference by the carrier of itself, and that an order forbidding further violation of section three of the statute should issue accordingly.

Railroads Inquiring for European Cars.

Owing to the fact that the unprecedented contracts recently placed with the various car-building plants throughout the country precludes the filling of big new orders for some months to come, it is reported that one of the Eastern roads is inquiring in Europe—both in England and on the Continent—with a view of placing a substantial contract for cars to be imported should better terms of delivery be secured than can be obtained on this side under present conditions.

It is estimated that the various railroad equipment companies comprising the American Car & Foundry Company, the Pressed Steel Car Company, the Pullman Company, the American Locomotive Company, the Baldwin Locomotive Works, etc., have on their books unfilled contracts representing in the aggregate no less a sum than a quarter of a billion dollars. The American Car & Foundry Company's different shops are reported to be taxed to the utmost capacity for a period extending well into the spring of 1907.

M. M. Association Circular of Inquiry.

The Committee on Classification of Locomotive Repairs of the Master Mechanics' Association has sent out the following circular of inquiry to members of the Association:

1. How do you distinguish between engines in service and those undergoing or waiting repairs, whether in roundhouse or shop?
2. If you have a limit, how is it defined?
3. If defined by considering an engine out of service if held for repairs for a certain time such as 24 or 48 hours, does that time commence when an engine is called for and not ready, or does it commence when an engine arrives at the roundhouse?
4. Do you make any distinction between running and shop repairs?
5. If so, how is the distinction defined?
6. Have you any classification of shop repairs?
7. Please send with your reply five copies of your classification of shop repairs.
8. Do you advocate any system of classification distinguishing between engines in service and those under repairs, between running and shop repairs, and any system of classifying shop repairs other than that you are now using. If so, describe the system you would recommend and give reasons for its use.

Members are requested to forward their replies promptly to H. H. Vaughan (Chairman), Superintendent Motive Power, Can. Pac. Ry., Montreal, Canada.

Manufacturing and Business.

The Goodwin Car Company has moved its offices from 96 Fifth avenue to the Whitehall Building, 17 Battery Place, New York.

Joel Bernice Ettinger has been appointed western manager of the S. A. Woods Machine Co., Boston, Mass., with offices in the Railway Exchange Building, Chicago.

The Guayaquil & Quito has let a contract to the American Bridge Company for nearly 100 small bridges to span the chasms and ravines along its line in the Andes.

W. W. Young, formerly General Agent, and recently Acting Purchasing Agent, has been appointed Purchasing Agent of The Union Switch & Signal Co., Swissvale, Pa.

E. B. Leary has been appointed as department manager of the Pittsburg department of the U. S. Metal & Mfg. Co., New York, former Department Manager Eugene L. Caton having resigned.

H. W. Edwards, Mem. Am. Soc. C. E., who resigned as Chief Engineer of the Chihuahua & Pacific last August, upon the completion of its construction, has opened an office as consulting engineer at 80 Broadway, New York.

The St. Louis Car Company has secured an order for 700 of its standard reversible car seats, covered in rattan with top rail and nickel-plated trimmings, from the Anglo-Argentine Tramway Company, of Buenos Ayres, South America.

The American Railway Equipment Co., of San Antonio, Tex., has been organized with a capital of \$100,000 to make railroad equipment. The incorporators include: John Hendricks and C. W. Gill, of Galveston, and D. F. Youngblood, of San Antonio.

The Coale Muffler & Safety Valve Co., Baltimore, Md., announces

that the Nathan Manufacturing Company, New York, has taken over its business, and all orders or inquiries concerning the same in the future should be addressed to the last named company.

The Anglo-American Varnish Company, of Newark, N. J., has just been granted a charter by the Dominion Government. It will manufacture japans, lacquers, varnishes, oil and pigments. The capital stock is \$20,000, and the headquarters will be in Montreal. Mr. Marshall will be President.

Charles A. Olson, who for several years has been superintendent of the flanged fitting department of Crane Co., Chicago, has been promoted to the newly created position of general superintendent of that company. Mr. Olson was formerly superintendent of the St. Petersburg, Russia, plant of the Societe Anonyme Westinghouse.

Residents of Lynchburg, Va., have organized the Old Dominion Bridge & Construction Co. with a capital of about \$300,000. The company has bought about 25 acres of land adjacent to the Southern Railway in the suburbs of the city, on which it will build shops next spring. The directors are: Walker Pettyjohn, President; William Hurt, Vice-President; A. R. Long, Secretary; W. L. Moorman, Treasurer, and others.

The Belle City Malleable Iron Co., Racine, Wis., which has a present capacity of 7,000 tons a year, is adding buildings to increase this by January 1st to 10,000 tons. There are two new buildings, one being 100 ft. x 200 ft., containing two new furnaces, and the other 80 ft. x 100 ft., containing four new annealing ovens. The output of this plant is largely railroad and agricultural work, the former being in the line of specialties.

Mr. David R. McKee, Jr., who has been connected with the Chicago office of the Western Steel Car & Foundry Co., now holds a position in the sales organization of the T. H. Symington Co., of Baltimore, with headquarters in the western sales office of the company, Railway Exchange Building, Chicago. Previous to his connection with the Western Steel Car & Foundry Co., Mr. McKee was in the engineering department of the Delaware, Lackawanna & Western (coal department).

The various stations and shops of the Philadelphia Rapid Transit Company furnish an interesting exhibit of the variety in products manufactured by the B. F. Sturtevant Co., of Boston, Mass., for the equipment of plants of this class. In the various sub-stations are no less than ten steel plate fans especially designed for cooling transformers. In one of its shops is a complete heating and ventilating system consisting of fan, heater and distributing pipe. In another is a forge shop equipment, together with an exhaustor for removing smoke, while a large cupola furnace is supplied with a Sturtevant pressure blower.

The Hayes Track Appliance Co., Geneva, N. Y., in advertising the Hayes lifting and pivot derails, goes into particulars in a way that leaves nothing to be desired. It has issued a circular informing the reader that 430 of these appliances are in use on the Pennsylvania railroad system (naming 13 of the roads in the system), and gives a list of the 60 or more towns on these lines in which the derails have been applied during the past 18 months; and circulars in similar detail have been issued about the 1,022 derails in use on New York Central lines, 351 on the Baltimore & Ohio and 590 on the Atchison, Topeka & Santa Fe.

The Standard Paint Co., New York, is distributing broadcast to the trade throughout the United States a circular letter in which it states that it is the only maker of "Ruberoid Roofing." The company was prompted in distributing this letter for the reason that it has received numerous complaints from dealers in and consumers of Ruberoid Roofing that inferior imitations of it, many of them having similarly sounding names, had been sold under the deliberate misrepresentation that these imitations were actually Ruberoid Roofing or that they were made by the Standard Paint Company or some concern which was or has been affiliated with the Standard Paint Company.

The interests controlling the Bedford Quarries Co., Bedford, Ind., and the Ohio Quarries Co., North Amherst, Ohio, with head offices at Chicago, are planning a large increase in the output of their limestone and sandstone properties at these points. New equipment for next year will include 18 Sullivan stone channeling machines, which have been ordered through Geo. D. Hunter, representing the Sullivan Machinery Co., Chicago, at Bloomington, Ind. These machines are of the Class Y rigid head type, with boiler. This channeler has been developed especially for the needs of the building stone districts and is a standard machine for this service. The Bedford Quarries Co. already has 10 machines of this type in use and the Ohio Quarries Co. has eight similar machines, especially adapted for cutting sandstone at its North Amherst quarries. The Consolidated Stone Co. has ordered four of the new Class Y Sullivan oolitic type channelers with 8-in. cylinders, for use at its quarries at Bloomington and Bedford. This company will then have 21 Sullivan machines at these two properties. The New York

office of the Sullivan Machinery Co. has secured from F. A. Manelli & Co. an order for two Class Y-8 channelers and several rock drills, for use at Rochester, N. Y., on the Erie Canal improvements.

Iron and Steel.

The American Bridge Co. has lately received orders for about 50,000 tons of structural and fabricated material, principally from railroads.

The Republic Iron & Steel Co. has increased the price of bar iron \$4 a ton on a basis of \$2 per 100 lbs. in Youngstown, Ohio, instead of \$1.80, as formerly.

The City & County Contract Co., New York, which is building the New York, Westchester & Boston Railroad, is asking bids December 19 for 16 bridges requiring about 4,000 tons of steel.

Orders have recently been let for rails for 1906 delivery as follows: Duluth, Virginia & Rainy Lake, 8,000 tons; St. Louis, Troy & Eastern, 5,000 tons. The proposed extension of the Chicago, Milwaukee & St. Paul will necessitate the laying of from 1,200 to 1,500 miles of new line, which will call for about 175,000 tons of rails. The Baltimore & Ohio has let a contract for 16,000 tons of rails with an eastern mill for 1906 delivery.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Franklin Institute.

At a meeting of the Sections in Philadelphia December 17, the program included a paper on "New Laboratory Methods and Appliances," by S. S. Sadtler; also one on "Analytical Notes," by Dr. Henry Leffmann.

American Society of Civil Engineers.

At the regular business meeting of this society in New York December 6, a vote was taken on the admission of new members and a paper presented on "A New Graving Dock at Nagasaki, Japan," by Naoki Shiraiishi. This paper was printed in the October "Proceedings."

The Northern Railway Club.

A new railroad club was organized on Nov. 28th in Duluth, Minn., under the above name. The charter membership is about 140. The officers are: President, W. A. McGonagle, Vice-President and General Manager, D. M. & N.; First Vice-President, E. C. Blanchard, Superintendent, Nor. Pac.; Second Vice-President, H. S. Bryan, Supt., M. P., D. & I. R.; Secretary, C. L. Kennedy, Coml. Agt., C. M. & St. P.; Treasurer, J. I. Thomas, Joint Local Frt. Agt. A committee on constitution and by-laws was appointed. The next meeting will be held Dec. 29th in the Spalding Hotel, at which time papers on the following subjects will be presented: "Railroad Organization," by F. E. House, President Duluth & Iron Range; "Variation in Heights of Couplers," by J. E. Goodman, Master Mechanic, Northern Pacific.

PERSONAL.

—Mr. J. B. Flaherty, who is now Superintendent of the



J. B. Flaherty.

—Mr. John Baird Morford, Assistant to the General Manager of the Michigan Central, died at his home in St. Thomas, Ont., on November 28, of pneumonia. Mr. Morford was widely known. He

now Superintendent of the Colorado Springs & Cripple Creek District Railway, was, in 1895, train despatcher of the Midland Terminal. He was promoted the next year to be chief despatcher of the same road, holding that office until 1901, when he was made trainmaster. In 1903, he went to the Grand Trunk as train despatcher at Island Pond, Vt. The next year he went to California, but in April of this year left and was appointed trainmaster of the Florence & Cripple Creek and the Midland Terminal. Here he remained until appointed Superintendent of the Colorado Springs & Cripple Creek. He is also Superintendent of the Midland Terminal and the Florence & Cripple Creek.

was born in 1840 and entered railroad service in 1852 as water boy on the New York & Erie. He remained on that road until 1866 as brakeman and later conductor on the different divisions. In that year he went to the Morris & Essex, where he was chief train despatcher. Five years later he went to the New York Central & Hudson River as General Agent at New York, becoming later station master at the Grand Central Station. In 1873 he was appointed General Superintendent of the Long Island, and from 1875 to 1882 was Superintendent of the Sandy Hook Steamboat Co. and later Superintendent of Ferries of the Central of New Jersey. Leaving New York, he went to Texas and was Superintendent of Construction of the Sabine & East Texas, but the next year he went to the Michigan Central as Assistant Superintendent of the Eastern & Toledo division, and has been on that road ever since. He was soon made Superintendent of the Canadian division (the Canada Southern), and held the place many years. About two years ago he was promoted to the position which he held at his death.

—Mr. Barrett B. Mitchell, recently appointed Freight Traffic Manager of the New York Central Lines west of Buffalo, was born in 1846. His first railroad service was in 1867 as a clerk of the Blue Line, at Detroit. He remained in the Detroit offices of this company until 1878, having been appointed chief clerk in 1871. He was then promoted to the office of General Manager, where he remained until 1895. During the last ten years of this period he also acted as General Manager of the Canada Southern Fast Freight Line. He became General Freight Agent of the Michigan Central in 1895, and in 1896 was made General Freight Traffic Manager, which he has been until his latest appointment. The photograph of Mr. Mitchell, reproduced herewith, was, by an unfortunate mistake, published in the *Railroad Gazette* of November 24 as that of Mr. J. M. Connell, General Passenger Agent of the Atchison, Topeka & Santa Fe.



B. B. Mitchell.

ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—J. R. Kenly, Fourth Vice-President, has been elected Third Vice-President, succeeding T. M. Emerson, promoted.

Bessemer & Lake Erie.—F. R. Layng has been appointed Engineer of Bridges, with office at Greenville, Pa.

Canadian Pacific.—W. A. Cooper, Assistant Superintendent of Sleeping, Dining and Parlor Cars, has been appointed Superintendent of that department, with office at Montreal, succeeding George McL. Brown, promoted.

Chicago, Burlington & Quincy.—C. S. Bricker has been appointed Master Mechanic of the Sheridan Division, with office at Sheridan, Wyo., succeeding C. J. Sabersagen, resigned.

Chicago, Milwaukee & St. Paul.—W. J. Underwood, Assistant General Manager, has been appointed General Manager, succeeding H. R. Williams, resigned.

Cincinnati, Hamilton & Dayton.—G. W. Perkins has been elected Chairman of the Board of this road and of the Pere Marquette.

Copper Range.—E. H. Wright, Auditor and General Freight and Passenger Agent, has resigned. F. R. Bolles has been appointed General Freight and Passenger Agent, and Wallace Tedford, Auditor, both succeeding Mr. Wright.

Grand Trunk.—R. G. Butler has been appointed Manager of the Grand Trunk Milwaukee Car Ferry, with office at Milwaukee, Wis.

Gulf, Colorado & Santa Fe.—A. C. Fonda and J. R. Dillon have been appointed Assistant General Freight Agents, both with offices at Galveston, Tex., succeeding Y. Van den Berg, resigned.

Halifax & Southwestern.—L. H. Wheaton has been appointed Chief Engineer, with office at Bridgewater, N. S., succeeding T. H. White, assigned to other duties.

Interstate Commerce Commission.—Franklin Lane of California has been nominated by the President to succeed Commissioner J. W. Fifer, whose resignation takes effect January 1, 1906.

Mexican Central.—H. W. Ridgeway, Superintendent of Shops at Aguascalientes, has resigned. George Tilton succeeds Mr. Ridgeway.

Missouri Pacific.—W. T. Tyler, General Superintendent of the Southern district, at Little Rock, has resigned, and is succeeded by Horace Baker, heretofore Assistant General Superintendent of the Southern at Greensboro, N. C. J. M. Walsh, Superintendent of the Joplin division, has been appointed Superintendent of the Northern Kansas division, with office at Atchison, Kan. G. H. Stapp succeeds Mr. Walsh, with office at Nevada, Mo.

New York Central & Hudson River.—The jurisdiction of I. A. McCormack, Manager of the "Harlem Line" (Grand Central Station to Mott Haven, New York City), has been extended from Mott Haven to High Bridge, about 2 miles, on the Hudson division, and to Wakefield, 7 miles, on the Harlem division. His title is General Superintendent of the Electric Division, High Bridge and Wakefield being the temporary northern termini of the lines which are to be electrified. Mr. McCormack will have charge of passenger train operation, but the direction of freight train and station operation, freight-car distribution and the despatching and recording of train movement north of Mott Haven will remain, until further notice, under direction of the respective division superintendents. The territories of R. E. Slater, Superintendent, and H. S. Balliet, Engineer of Maintenance of Way, have been similarly extended.

New York State Railroad Commission.—H. N. Rockwell has been appointed Commissioner. The other members are: Geo. W. Dunn, J. M. Dickey, M. Baker and G. W. Aldridge.

Norfolk & Southern.—J. Whetstone, Superintendent of Motive Power, has been appointed Marine Superintendent. J. E. Gould succeeds Mr. Whetstone.

Oregon Railroad & Navigation.—See Union Pacific.

Oregon Short Line.—See Union Pacific.

Pere Marquette.—See Cincinnati, Hamilton & Dayton.

Southern.—Horace Baker, Assistant General Superintendent, has resigned. E. H. Coapman, Superintendent of the Danville division, succeeds Mr. Baker, with office at Greensboro, N. C. H. A. Williams, Superintendent of the Savannah division, succeeds Mr. Coapman, with office at Greensboro. (See Missouri Pacific.)

The jurisdiction of J. B. Michael, Master Mechanic of the Knoxville division, has been extended over the Nashville division.

Southern Pacific.—G. L. King has been appointed Right of Way Agent, succeeding T. J. Wilson, assigned to other duties. See Union Pacific.

Union Pacific.—J. D. Isaacs has been appointed Consulting Engineer for the completed lines of this road and of the Oregon Short Line, the Oregon Railroad & Navigation and the Southern Pacific, with office at San Francisco.

Wheeling & Lake Erie.—R. L. Porter has been appointed Auditor of this road and of the Wabash-Pittsburg Terminal, succeeding W. M. Bonar.

LOCOMOTIVE BUILDING.

The Guayaquil & Quito has ordered six Mallet locomotives from the Baldwin Works.

The Canadian Northern has ordered 10 locomotives from the Canadian Locomotive Co.

The Atchison, Topeka & Santa Fe has ordered 20 locomotives from the Baldwin Works.

The Chicago & Eastern Illinois, it is reported, has ordered 55 locomotives from the Baldwin Works.

The Vandalia, it is reported, has ordered eight or ten locomotives from the American Locomotive Co.

The St. Louis & San Francisco has ordered 20 locomotives from the Baldwin Works and 25 from the American Locomotive Co.

The Norfolk & Western, it is reported, has ordered 25 locomotives from the Baldwin Works and 25 from the American Locomotive Co. Specifications for these engines were printed in our issue of November 24.

The Lehigh Valley, it is reported, has ordered 40 locomotives as follows: Twenty freight locomotives from the American Locomotive Co. and five freight and 15 passenger locomotives from the Baldwin Works. Deliveries are to begin in February and April, 1906.

The Chicago, Rock Island & Pacific, as reported in our issue of November 24, has ordered 50 simple consolidation locomotives from the Baldwin Works. These engines will weigh 201,000 lbs., and will have 180,000 lbs. on drivers; cylinders, 23 in. x 30 in.; diameter of drivers, 65 in.; wagon top boiler, with a working steam pressure of 185 lbs.; total heating surface, 2,923 sq. ft.; 340 National charcoal iron tubes, 2 in. in diameter x 15 ft. 6 in. long; firebox, 107 in. x 67 1/4 in.; grate area, 50 sq. ft. The tender will have a capacity of 7,000 gallons of water and 15 tons of coal. The special equipment includes: Walschaert valve motion, Richardson balanced slide valves, Gollmar bell ringers, Keasbey & Mattison boiler lagging,

Vanderbilt brake-beams, Major couplers, Hancock injectors, Magnus journal bearings, U. S. piston and valve rod packings, Hancock safety valves, Leach sanding devices, Nathan bull's-eye lubricators, Railway Steel Spring Co.'s springs, Ashcroft steam gages, Standard solid rolled truck and tender wheels and cast-steel wheel centers.

CAR BUILDING.

The Wisconsin & Michigan is in the market for 200 ore cars.

The Wabash, it is reported, is figuring on ordering upwards of 5,000 freight cars.

The Cleveland Electric, it is reported, has ordered 50 cars from the J. G. Brill Co.

The Green Bay & Western has ordered 20 new flat cars from F. M. Hicks & Co.

The Colorado & Southern is in the market for 1,500 freight cars and 20 passenger cars.

The Mexican Central has ordered 30 tank cars from the American Car & Foundry Co.

The Lehigh Valley has ordered 70 mining cars from the American Car & Foundry Co.

The Grand Trunk has ordered 25 standard first-class coaches from the Canada Car Co.

The Wilkesbarre & Hazleton has ordered 10 passenger coaches from the Jewett Car Co.

The Chicago & Eastern Illinois has ordered 6,250 freight cars from the American Car & Foundry Co.

The Duluth, Missabe & Northern has ordered 25 refrigerator cars from the American Car & Foundry Co.

The Suffolk & Carolina has ordered 25 box cars and 40 flat cars from the American Car & Foundry Co.

The Aurora, Elgin & Chicago (Electric) will shortly be in the market for additional passenger equipment.

The Virginia & Carolina Coast has ordered 40 flat cars and 25 box cars from the American Car & Foundry Co.

The East Carolina is in the market for one passenger car and one combination passenger and baggage car, either new or second-hand.

The Maine Central, as reported in our issue of October 20, has ordered 60 passenger coaches and two baggage cars from the Pullman Co.

The Buffalo, Rochester & Pittsburg has ordered 100 box cars, 100 hopper cars and 200 gondola cars from the American Car & Foundry Co.

The Great Northern is in the market for a large amount of additional freight equipment, and is reported as figuring on a number of new passenger cars.

The St. Louis, Rocky Mountain & Pacific has ordered 20 gondola cars and 12 box cars from the American Car & Foundry Co. and 20 gondola cars from F. M. Hicks & Co.

The Chicago, Rock Island & Pacific has ordered 1,000 box cars, 400 stock cars, 10 cabooses, two passenger cars and two combination cars from the American Car & Foundry Co.

The El Paso & Southwestern has ordered 50 Hart convertible cars of 100,000 lbs. capacity from the Rodger Ballast Car Co., for March, 1906, delivery. The special equipment includes: Simplex bolsters, More-Jones brasses and Miner draft rigging.

The New York Central Lines, it is reported, have ordered for the Big Four and Lake Shore 27 smoking cars, 14 combination passenger and observation cars, two postal cars, two combination baggage and mail cars, two café cars and three dining cars from Barney & Smith.

The Central of New Jersey, as reported in a previous issue, has ordered 50 covered ore cars from the Pressed Steel Car Co. These cars will have a capacity of 80,000 lbs. and will be 20 ft. 6½ in. long x 7 ft. 6 in. wide, inside dimensions, and will be fitted with steel underframes. The special equipment will include: Kewapnee brake-beams, Tower all-steel couplers and twin spring draft rigging.

The Eureka & Palisade, as reported in our issue of December 1, is in the market for 30 ore cars of 30,000 lbs. capacity. The company writes that it is trying, if possible, to get second-hand narrow-gauge gondolas or coal cars with bottom openings. The cars should conform to the following general specifications: Length, 22 to 24 ft.; width, 7 ft.; diameter of wheels, 24 in. The special equipment should include Westinghouse air-brakes.

The Illinois Central has ordered 1,500 box cars of 80,000 lbs. capacity and 500 refrigerator cars of 60,000 lbs. capacity from the

American Car & Foundry Co., for February, April and May, 1906, delivery. The box cars will weigh 37,500 lbs., and measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The refrigerator cars will weigh 36,400 lbs., and measure 37 ft. 11½ in. long, 8 ft. 2½ in. wide and 7 ft. 6½ in. high, inside measurements.

The Nelson Morris Company, Chicago, as reported in our issue of November 24, is building 100 refrigerator cars of 60,000 lbs. capacity at its own shops. These cars are for March, 1906, delivery, and will weigh 40,000 lbs. They will measure 28 ft. 6 in. long, 8 ft. wide and 7 ft. 4½ in. high, inside measurements. The special equipment will include: Simplex bolsters and brake-beams, Westinghouse air-brakes, Laflare doors, Miner draft rigging and Griffin car wheels.

The Lake Shore & Michigan Southern, as reported in our issue of November 24, has ordered 1,000 furniture cars from the American Car & Foundry Co., for April, 1906, delivery. These cars will have a capacity of 60,000 lbs. and will be 40 ft. long. The special equipment will include: Diamond trucks, Simplex bolsters, Westinghouse brakes, Buffalo brake-beams, Gould couplers, Railway Steel Spring Co.'s springs, Magnus metal journal bearings, Susemihl side bearings and Camel doors and door fastenings.

The Pittsburg & Lake Erie, as reported in our issue of November 24, has ordered four combination passenger and baggage cars, five 70-ft. coaches and five 50-ft. coaches from the American Car & Foundry Co. The special equipment for the above cars will include: Paige wheels, Commonwealth bolsters, Westinghouse brakes, Diamond special brake-beams, Gould couplers, drawbar attachments, journal boxes and vestibules, Railway Steel Spring Co.'s springs, Pintsch lighting system and Chicago Car Heating Co.'s heating system.

The Tehuantepec National, as reported in our issue of November 10, has ordered 300 steel frame box cars from the American Car & Foundry Co. These cars are of 60,000 lbs. capacity and weigh about 34,000 lbs. They will be 36 ft. long x 8 ft. 6 in. wide x 8 ft. high, all inside dimensions. The special equipment will include: American Steel Co.'s axles, American Steel Foundries' bolsters, National-Hollow brake-beams, M. C. B. standard brake-shoes, Westinghouse brakes, Tower couplers, Wagoner door fastenings, American Car & Foundry Co.'s draft rigging, dust guards and journal boxes, corrugated galvanized iron roofs, American Car & Foundry Co.'s springs and Diamond arch-bar trucks.

The Boston & Maine, as reported in our issue of November 17, has ordered 20 passenger cars from the Pullman Co. for January, 1906, delivery. These cars will have a seating capacity for 72 persons and will weigh 75,300 lbs. each. They will be 59 ft. 2½ in. long x 8 ft. 10½ in. wide x 9 ft. 4 in. high, all inside dimensions. The bodies and underframes will be of wood. The special equipment includes: Hammond axles, double iron bolsters, National-Hollow brake-beams, Christie brake-shoes, Westinghouse brakes, Gould couplers, Vinton's patent curtain bottom irons, Pantasote curtain material, Pintsch gas, Gould standard platforms, tin roofs, Crucible Steel Co.'s springs, four-wheel B. & M. standard trucks, and 36-in. wheels fitted with Allen No. 9 Krupp tires.

BRIDGE BUILDING.

CHEYENNE, OKLA. T.—Bids are wanted January 3 by John H. Osborn, County Clerk, for building an iron bridge 85 ft. long over the Washita river in Roger Mills County.

LONG ISLAND CITY, N. Y.—Out of the city bond issues, money amounting to \$175,000 will be used to build a retractile bridge over Dutch Kills creek. The plans have been completed by Engineer Edward A. Byrne and bids may be asked for during the present month.

MONESSEN, PA.—Contracts have been given to the Friday Contracting Co. for the substructure and to the American Bridge Co. for the superstructure of the bridge to be built for the Mercantile Bridge Co. over the Monogahela river at this place. The contracts which have just been let call for the completion of the work by Dec. 1, 1906. The proposed structure will be a combined highway and street railroad bridge to carry two tracks. It will consist of two spans each 400 ft. long, with a 500-ft. approach on the west side.

NORRISTOWN, PA.—Separate bids are wanted December 27 by the Commissioners of Montgomery and Chester Counties for building the substructure and superstructure of an inter-county highway bridge over the Schuylkill river near Sanatoga, on the Philadelphia & Reading.

PORTLAND, ORE.—Plans are being made for building a steel bridge about 400 ft. long over Montgomery slough and lower Albina.

Other Structures.

ANGELICA, N. Y.—The Pittsburg, Shawmut & Northern has started work putting up shops here.

ATHENS, GA.—The Central of Georgia will improve its yards and build a large freight house here at a cost of about \$100,000.

CHARLESTON, S. C.—A contract has been given to Grant Wilkins, of Atlanta, Ga., at \$152,000 for building the union passenger station here. There were ten bids submitted ranging from \$152,000 to \$182,000.

LETHBRIDGE, ALBERTA.—The Canadian Pacific will build terminals here and put up a 10-stall roundhouse and repair shops; also a freight shed 500 ft. long.

OMAHA, NEB.—The Union Pacific is planning to make large additions and improvements to its property at this place. The company will put up large locomotive and car shops.

SHAWNEE, OKLA. T.—The Atchison, Topeka & Santa Fe is putting up a \$25,000 electric lighting plant for lighting its roundhouses, buildings and yards. New machinery at a cost of about \$100,000 will also be put in at its shops here.

TORONTO, ONT.—The Grand Trunk roundhouse at this place was destroyed by fire November 26, and several locomotives were burned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BAY CITY & PORT HURON.—An officer writes that this company, which was incorporated some time ago to build a railroad from Bay City, Mich., to Port Huron, a distance of 105 miles, has 20 miles of grade completed from Port Huron to Lexington. The work is not difficult. It will include the building of two steel bridges and a number of small bridges. W. C. Penoyar is President. The project will be financed by George B. Jenkinson, 35 Nassau street, New York, who will have the final surveys completed at once and who will give the contract for the balance of the work to a construction company of which he will be President. (May 12, p. 158.)

BROOKLYN RAPID TRANSIT (BROOKLYN, N. Y.).—This company will at once begin extending its Myrtle avenue elevated line from Ridgewood to Middle Village, a distance of two miles. The company has bought about 30 acres of land known as St. James park, which will be filled in and used for a large yard to have a capacity of 300 cars.

CENTRAL OF NEW JERSEY.—A contract has been let by this company to C. R. Kingsley, of Scranton, for extending its tracks from Truesdale City in Luzerne County, Penn., to the West End Coal Co.'s colliery at Mocanaqua, and to connect with its own tracks over its River branch to Shickshinny, a distance of about four miles. The work includes several deep cuts through solid rock.

CHICAGO, BURLINGTON & QUINCY.—See Denver & Beaver Valley below.

CHICAGO, MILWAUKEE & ST. PAUL.—A contract is reported let by this company to McIntosh Bros., Milwaukee, for building about 800 miles of the extension from Everts, S. Dak., on the Missouri river, west toward the Pacific Coast. Contracts for the rails are said to have been given to the United States Steel Corporation.

Announcement has been made by this company that it is operating 40 miles of its extension now under construction from Chamberlain, S. Dak., west to Rapid City, 200 miles. This new line parallels the Chicago & North-Western extension now building from Pierre to Rapid City.

COLORADO SOUTHERN, NEW ORLEANS & PACIFIC.—An officer writes that this road is being built by the Kenefick, Quigley & Hammond Construction Co., of Beaumont, Tex., and that work is under way. (November 10, p. 149.)

CUMBERLAND RIVER & NASHVILLE.—This company, which was incorporated to build a railroad from Corbin, Ky., west to Burnside, thence southwest via Monticello and Albany to the Tennessee state line, and which surveyed the proposed line from Corbin to Monticello, 63 miles, last spring, has let a contract for building the road from Burnside, on the Cincinnati Southern, to Monticello, 20 miles. Under the name of the Nashville & Northeastern, the road will be built from the Tennessee line to Nashville. The road will traverse a rich district in timber, coal and oil. Connection will be made with the Chesapeake & Nashville at Westmoreland, Tenn. (November 17, p. 159.)

DEERING SOUTHWESTERN.—This company, which operates a freight line from Deering, Mo., to Camp, a distance of six miles, connecting at the former place with the Frisco system, has filed an amendment to its charter providing for an extension from its western terminus south in Dunklin County to the state line, about 10 miles.

DELAWARE & EASTERN.—Construction work is being pushed on this proposed road by the John R. Lee Construction Co., of Paterson, N. J., which has the contract. The work was begun in August of this year and 18 miles have already been completed. The pro-

posed route is from the east branch of the Delaware river in New York State, touching the Ontario & Western at Eastbranch, west to the Ulster & Delaware at Arkville, through a rich timber and quarry section, a distance of 45 miles. The company, which is capitalized at \$1,000,000, is being promoted by Searing & Co., 7 Wall street, New York City. (Oct. 6, p. 111.)

DELAWARE & HUDSON.—An officer writes that this company has under consideration the building of a road from South Wilkesbarre to Yatesville, Pa., to form a connection with the Pennsylvania road. It has not yet been definitely decided whether work will be let by contract; it may be done by the company's forces.

DENVER & BEAVER VALLEY (C., B. & Q.).—This company has recently been incorporated as a subsidiary line of the Chicago, Burlington & Quincy to build 100 miles of line from Oberlin, Kan., to Uray, Colo.

INDIANA ROADS (ELECTRIC).—Contracts have been let to A. M. Weedon, of Alexandria, and P. T. O'Brien, of Elkwood, Ind., for building an interurban road from Fort Wayne, Ind., northwest to South Bend, 70 miles air line. There will have to be 25 bridges. A. J. Behymer, of Elkwood, is one of the incorporators.

JALISCO RAILWAY.—Incorporation has been granted a company under this name in Maine with a capital of \$7,500,000. Frederick Seward, of New York, is Treasurer and one of the directors. The purposes of the company are to buy and use the contract and concessions granted by the government of Jalisco, Mexico, to Melvin C. Miller to build a railroad from Guadalajara to a point on the coast of the Pacific near Chamelainjalisco, with a branch line from Guadalajara to LaSoledad.

JUNCTION RAILROAD.—This company's tunnel under Neville street, Pittsburg, is to be abandoned and a new tunnel will be pierced at a cost of about \$2,000,000. This change is made necessary in connection with the removal of the company's tracks from their present location at Junction Hollow to Boundary street. In the cut from the Monongahela river to the mouth of Neville street tunnel the line will have a grade of 32 ft. less than the present line.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Announcement has been made that this company opened for traffic on December 3 its extension from Thief River Falls, Minn., to Kenmare, N. Dak., a distance of about 300 miles. The new road passes through the center of territory covered by the Great Northern and crosses 12 branch lines of the latter which were built through the Red River district. It is expected to secure a large share of the grain traffic.

MORGAN'S LOUISIANA & TEXAS (SOUTHERN PACIFIC).—An officer writes that surveys are being made to build a line from Baton Rouge, La., southwest to Lafayette, a distance of 53 miles; also that surveys have been completed for an extension from Arnaudville north for a distance of 12 miles to Port Barre. Rights of way are being secured.

MUNISING.—This company has applied for an amendment to its charter giving authority to build branches from a point on its line at Little Lake station, in Marquette County, Mich., to Austin and Princeton mines, a distance of 7.3 miles; from the northern terminus on Munising bay northeasterly, paralleling the shore of Lake Superior, to a point in Alger County, 25 miles; and for a line from its main line south to a connection with the Delta Lumber Co.'s road in Schoolcraft County, 24 miles.

NASHVILLE & NORTHEASTERN.—See Cumberland River & Nashville above.

OREGON & IDAHO.—An officer writes that this company, recently organized to build a railroad from Ontario, Ore., to Emmett, about 30 miles, will be built at once. Bids are being asked for the work but no contracts have as yet been let. The work will be light and includes the building of one bridge over the Snake river. The maximum grade will be 1.5 per cent. and the maximum curvature 5 deg. O. V. Allen, of Boise City, Idaho, and O. C. Wright, of Sumpter, Ore., are the engineers in charge. Information will be furnished by the latter. (Nov. 17, p. 159.)

PEA RIVER VALLEY & GULF.—An officer writes that this road will be built from Opelika, Ala., southwest through Union Springs, Brundige, Enterprise, Chancellor and Geneva, Ala., and Darlington and DeFuniak Springs, Ala., to Portland, Fla., on Choctawhatchee Bay, on the Gulf of Mexico, a total distance of about 190 miles. No track has been laid. The company intends to buy a short existing line running north from DeFuniak Springs about 12 miles. The time for asking bids for the work has not yet been fixed. The work will be light; maximum grade 1.1 per cent., and light curvature. The work includes the building of three small bridges. Surveys have been completed for a part of the proposed line. Connection will be made at Opelika, the northern terminus, with lines running northwest to Birmingham, Ala., and northeast to Atlanta, Ga. From the southern terminus at Portland there is a favorable water route through the East Pass crossing the gulf to Cuba and South American countries. (November 24, p. 167.)

PENNSYLVANIA.—An officer writes that the program of the Engineering department for improvements to be carried out during the next year includes: A new low-grade, double-track freight line from Glenlock to West Philadelphia to cost \$7,000,000; two additional tracks from Trenton, N. J., to Waverly, as a continuation of the low-grade freight line to New York, \$5,500,000, and third and fourth tracks on the Middle division for about 12 miles to cost \$2,500,000.

PENNSYLVANIA LINES WEST.—The Pennsylvania Company's new cut-off from Ravenna eastward to Niles, Ohio, where connection is made with the Pittsburg, Youngstown & Ashtabula division, has been opened for business. The Cleveland & Pittsburg, between Cleveland and Ravenna, has also been rebuilt. The company now has lines between Cleveland and Pittsburg over three routes: One via Ravenna and Youngstown, 138 miles; one via Alliance through Homewood, 140 miles, and the other via Alliance and Wellsville, 150 miles.

RICHMOND & CHESAPEAKE BAY (ELECTRIC).—An officer writes that this company, which proposes to build an electric railroad from Richmond, Va., north to Ashland, and thence to tidewater by a route not yet determined, has surveys under way and that contracts for grading were to be let about the first of this month. A contract has already been given to Charles Gasser for masonry. The maximum grades will be 1 per cent., but most of them will be $\frac{1}{2}$ per cent. There will be one overhead viaduct at Richmond about 2,700 ft. long. Frank J. Gould, of New York, is President, and C. P. E. Burgwyn, Chief Engineer, of Richmond, Va. (November 24, p. 167.)

SEABOARD AIR LINE.—See Tallahassee Southeastern below.

SOUTH & WESTERN.—A contract has been let by this company to S. Walton & Co., of Falls Mills, Va., for building 12 miles of its proposed road in Hawkins County, Tenn., and in Scott County, Va. The surveys, which are being made for this company by the George L. Carter Syndicate, will shortly be completed and bids for building about 200 miles of the proposed road will be asked for. (October 20, p. 128.)

SOUTHERN.—Announcement has been made by this company that it has opened for passenger traffic its Danville extension from Harrodsburg, Ky., south to Danville, a distance of nine miles.

SOUTHERN PACIFIC.—See Morgan's Louisiana & Texas above.

TALLAHASSEE SOUTHEASTERN (S. A. L.).—This company, which operates a line from Tallahassee, Fla., to Wacissa, on the Wacissa river, in Jefferson County, has let a contract to Blair Burwell, of Jacksonville, for building part of its proposed extension from Perry to Wacissa, on which work is under way. The road will be extended through Jefferson County into Taylor County and to Perry, connecting there with the Suwanee & San Pedro, now controlled by the Florida Railway Co., of Live Oak. The proposed road will cross the Aucilla river, Enconfina river and Long creek before reaching Perry, and will traverse a rich timber section.

TEXAS ROADS.—The Kenefick-Hammond-Quigley Construction Co., Beaumont, Tex., is asking bids for 300 miles of grading work between Baton Rouge, La., and Houston, Tex.

TIDEWATER.—This company, it is said, has let a contract to MacArthur Bros. Company for building 100 miles of its proposed road from a point near Lawrenceville, Va., west towards Rock, W. Va. The contract includes 21 tunnels from 350 to 3,500 ft. long, and the entire contract must be completed in two years. (November 17, p. 160.)

TOLEDO, MARSHALL & NORTHERN.—At a recent meeting of the stockholders of this company in Marshall, Ohio, the capital stock was increased from \$800,000 to \$2,000,000. The company will soon begin work on its proposed line from Bay City, Mich., southwest through Olivet, Marshall and Coldwater to Montpelier, Ohio. (April 14, p. 122.)

VIRGINIA & CAROLINA COAST.—This company, which will build a railroad from Norfolk, Va., to Beaufort, N. C., about 130 miles, has given a contract to J. G. White & Co., of New York, and work is now under way. The company will develop about 500,000 acres of timber lands in Virginia and North Carolina.

RAILROAD CORPORATION NEWS.

CINCINNATI, HAMILTON & DAYTON.—On December 4, Judson Harmon was appointed receiver of the Cincinnati, Hamilton & Dayton and the Pere Marquette on the petition of W. B. Horn, of New York. He stated that he was a creditor of the C., H. & D. to the amount of \$62,986. The petition also alleges that, while the defendant company was solvent prior to July 7, 1904, it has since that time assumed such obligations as to cripple it, particularly the purchase of the Pere Marquette stock for \$12,500,000, the agreement between the C., H. & D. and Pere Marquette and the Toledo Railway & Terminal Co. which involved large obligations for terminals in Toledo, and an agreement to carry \$3,500,000 bonds issued by the Pere Marquette to cover that company's purchase of the Chicago, Cincinnati & Louisville. It is further asserted that the cash assets of the

C., H. & D. and Pere Marquette on December 2, 1905, were less than \$100,000, although the interest on the Pere Marquette bonds mentioned above is due on January 1, 1906.

President Underwood of the Erie issued the following statement on November 29:

"It having appeared to the board of directors of the Erie that under existing conditions the purchase of the common stock of the Cincinnati, Hamilton & Dayton might involve obligations on the part of the Erie company interfering with the future development of its own railroad, the board of directors to-day voted unanimously to accept the offer of J. P. Morgan, himself to assume and complete that purchase on his own account, thus relieving the Erie Railroad from all costs, charges and contracts in the matter.

"The Erie board voted further to proceed with the sale of its \$12,000,000 convertible bonds as heretofore authorized, the proceeds to be used as authorized under the general mortgage of 1903 in the improvement of and extensions to its road. Of course, all stockholders who have subscribed to these bonds on the faith of the C., H. & D. stock being pledged thereunder will be released from their subscriptions if they so desire."

DELAWARE & HUDSON.—This company has purchased the Quebec Southern, which was recently sold at receiver's sale. (November 17, p. 160.)

DELAWARE, LACKAWANNA & WESTERN.—The directors have declared an extra dividend of 10 per cent. This makes 20 per cent. in dividends which have been paid this year, as compared with 17 per cent. last year and 7 per cent. during each of the two preceding years.

ERIE.—See Cincinnati, Hamilton & Dayton.

KANAWHA & MICHIGAN (TOLEDO & OHIO CENTRAL).—A committee has been formed to represent the minority stockholders of the Kanawha & Michigan in an effort to influence the directors of the road to distribute a portion of the net profits in a dividend to the stockholders. The committee makes the following statement: "The Kanawha & Michigan has enjoyed five years of great prosperity, in which the gross earnings have increased from \$759,069 to \$1,764,173, and by a favorable disposition on the part of the directors can easily begin to pay dividends on its \$9,000,000 of stock issued. The earnings for the next fiscal year indicate a gross of over \$2,000,000. Heretofore the management has been hindered from considering the claims of the stock because the increasing business has demanded every resource of the road to furnish facilities to handle it. Because of the clause binding the road not to increase its bonded debt (\$2,469,000) beyond \$15,000 per mile, increases of rolling stock and every addition and improvement to plant has had to be paid for out of earnings and temporary loans. In addition to such expenditure from earnings, which is estimated to have amounted to \$2,000,000 in five years, there has been added to its interest-bearing obligations \$2,705,330 debts for improvements, which have increased the charges per year from \$109,591 in 1900 to \$239,173 in 1905. The present charge of \$239,173, which includes payments to reduce equipment obligations, is not burdensome when the large earnings are considered, and by ordinary economy the road could show a satisfactory percentage earned on its stock in the last fiscal year." The committee, which is made up of George D. Mackay, of Mackay & Co., Chairman; W. H. Goadby, of W. H. Goadby & Co., of New York, and I. L. Ellwood, of Dekalb, Ill., is said to represent about one-half of the minority shareholders.

KANSAS CITY SOUTHERN.—Blair & Co. have bought \$1,440,000 4½ per cent. equipment notes of 1915 of this company. The equipment which secures these bonds is to be delivered within the next two months, and consists of 20 locomotives and 1,414 cars.

PHILADELPHIA COMPANY.—The Pittsburg Railways Co. will issue \$400,000 5 per cent. car trust bonds, maturing within ten years and guaranteed by the Philadelphia Co.

TOLEDO, ST. LOUIS & WESTERN.—The gross earnings for the year ended June 30 were \$3,785,165, an increase over the figures for last year of \$443,517. Operating expenses were \$2,851,099, an increase of \$424,925, making an increase in net earnings of \$8,332. The surplus after charges was \$172,613.

UNION PACIFIC.—The report for the year ending June 30 shows gross earnings of \$59,324,949, an increase of \$4,045,713. The operating expenses were \$30,370,702, an increase of \$1,344,095, reducing the operating ratio from 51 per cent. to 48 per cent. The surplus available for dividends was \$22,785,507, which is equal to 4 per cent. on the \$99,558,900 preferred stock outstanding and 11½ per cent. on the \$164,841,900 common stock outstanding. The surplus after all charges was \$7,219,282.

WESTERN MARYLAND.—The income account for the year ended June 30 shows gross earnings of \$3,900,249, an increase of \$143,057. Operating expenses and taxes amounted to \$2,512,421, an increase of \$189,206, making a decrease in net earnings of \$46,149. The surplus after charges was \$206,097, a decrease of \$194,345.

